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ABSTRACT

The report documents third year activities of the Educational Center for Disabled Students serving college students with a broad range of both physical and learning disabilities at the University of Nebraska-Lincoln. Center goals include improving student academic performance and attitudes through the use of computer technology and academic skills training, establishing the Center utilizing appropriate computer equipment and software, and disseminating model project information. Major third year activities focused on continued evaluation of Center activities and outcomes and development of replication materials. Specific achievements were: (1) development of a formal assessment methodology for assessing educational and technological needs of disabled students; (2) component evaluation of Center technological, skill training, and adaptive interventions; (3) development of resource materials for technology and software vendors; (4) expanded program evaluation through expanded student and staff logs; (5) presentations and papers focused on replication oriented materials; (6) development of formal papers covering Center assessment techniques, intervention methodology, and evaluation results; (7) increasing business community dissemination; and (8) development of a replication booklet. Appendixes include planning documents, assessment instruments, suggested intervention strategies, a bibliography of information sources, and an inventory and vendor list. (DB)

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DEMONSTRATION PROJECT

1987 - 1988 FINAL REPORT

Prepared by

Christy A. Horn
Project Coordinator

Duane F. Shell
Research Assistant

EDUCATIONAL CENTER FOR DISABLED STUDENTS

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I. PROJECT OVERVIEW

A. Goals and Objectives

The Educational Center for Disabled Students was established at the University of Nebraska-Lincoln in August, 1985 to provide services to students with a broad range of both physical and learning disabilities. The goals of the Center are to:

1. Improve student academic performance and attitudes toward success in college through the use of computer technology and academic skills training.

2. Establish the Educational Center for Disabled Students utilizing appropriate computer equipment and software.

3. Disseminate model project information concerning computer technology and academic training to prospective students, parents, the business community and other postsecondary institutions.

Specific program objectives related to these goals are specified in the Formative Evaluation Plan provided in Appendix A.

First year activities focused on the establishment and organization of the Center and involved the following:

1. Development of an overall evaluation plan for the Center.

2. Identification of the service population and the specific educational needs to be addressed by the Center.

3. Identification and procurement of the physical aspects of the Center, including computers, software and needed adaptive equipment.

4. Identification of academic and skill training materials necessary to supplement and enhance the usability of the physical equipment in the Center.

5. Initiation of project dissemination activities.

Details of these first year activities and first year accomplishments are provided in the 1985 - 1986 Final Report.

Second year activities focused on implementation of interventions, evaluation of Center effectiveness, and dissemination. Major second year activities were:

1. Implementation of Center services in accordance with Center objectives and expansion to new students.

2. Completion of initial summative outcome evaluation.

3. Expansion of dissemination activities.

4. Initial formalization of interventions (technological and adaptive) and assessment procedures and instruments for replication.

Details of these second year activities and accomplishments are provided in the 1986 - 1987 Final Report.

As indicated in the 1986-87 Final Report, third year activities were focused on continued evaluation of Center activities and outcomes and development of replication materials. Major third year activities, summarized by program goal, were:

A. Goal 1: Improve Student Academic Performance and Attitudes Toward School.

1. Development of a formal assessment methodology based on the Center's IPO Model for assessing the educational and technological needs of disabled students.

2. Component evaluation of Center technological, skill training and adaptive interventions to further define intervention methodology.

B. Goal 2: Establish Educational Center for Disabled Students.

1. Development of resource materials for technology, software and vendors concerning available materials for post-secondary applications.

2. Expanded program evaluation focussing on more detailed information gathering through expanded student logs and staff logs.

C. Goal 3: Disseminate Model Project Information.

1. Targeting of presentations to yet-to-be reached audiences.

2. Focussing presentations and papers on replication oriented materials.

3. Development of formal papers covering Center assessment techniques, intervention methodology, and evaluation results.

4. Increasing business community dissemination activities to provide information on technology and aid in student transition to the workplace.

5. Development of a replication booklet containing technology resources, an assessment manual, an intervention manual, and evaluation materials.

This report will summarize third year accomplishments related to the activities indicated above. Activities and outcomes will be cross referenced with the Evaluation Plan (Appendix A). Accomplishments related to Center objectives will be summarized in this section. Section II will discuss the client population changes and environment. Section III will provide evaluation results from the summative and formative evaluation activities. Section IV will summarize dissemination activities. Section V will discuss replication activities and products. A summary of the third year will be provided in Section VI. Finally, a summary of the entire ECDS project and future directions for the Center will be provided in Section VII.

B. Accomplishments/Milestones

Program objectives are detailed in the Center Evaluation Plan (Appendix A). Third year accomplishments for the objectives related to each program goal will be detailed in this section. A summary of accomplishments by objective is provided in the Third-Year Evaluation Plan Progress Report (Appendix B).

Goal 1: Improve Student Academic Performance

Objectives for Goal 1 focus on assessment of student needs, delivery of services and evaluation of student progress. Accomplishments in relation to evaluation objectives for each program objective follow.

Objective 1.1 is to evaluate student needs for technology and skill training. The Center had a large increase in the student user population due to the termination of another program for learning disabled students on the campus. A delay in transferring records caused many students to not be contacted by the Center until well into the academic year. As a result Center intake needs assessments were delayed beyond the scheduled assessment period and were not completed for all students. The staff is attempting to complete all assessments and at least part of the assessment process has been completed for all student users with physical or visual disabilities. Also, previous assessment data has been obtained for most learning disabled student users, with supplemental assessment using the ECDS LD Assessment conducted on students requiring more detailed evaluation. The primary activity related to Objective 1.1

for the third year was the formalization of assessment procedures. This process has been completed through refinement of the ECDS Educational and Computer Needs Assessment Process and the development, in conjunction with a clinical psychologist, of the ECDS Learning Disabilities Assessment Process. These assessment procedures are detailed in the ECDS Replication Manual. Thus, the ECDS has been successful in achieving replication goals for assessment, but has experienced problems with service related student assessment activities.

Objectives 1.2 and 1.3 concern delivery of training in technology and academic skills identified student needs. Individual training was continued for computer applications and adaptive equipment and a class for the Cognitive Skills course was instituted (see 1985-86 Final Report for the description of the Cognitive Skills program). The primary third year activity related to these objectives was the further specification of use patterns and staff training activities. Data from student use logs during the sample month of April, 1988 indicated that students had 233 hours of Center use during the month. Computer use accounted for the most time (121 hours, 52%) with traditional services accounting for 71 hours (30%) and academic training/support accounting for 41 hours (18%). These findings indicate that students are primarily utilizing the ECDS for technological and academic services rather than for general disabled student services such as registration or class access assistance. Full discussion of the evaluation of use logs and the student follow-up survey are provided in Section III. Center intervention strategies have been further refined and are detailed in the ECDS Replication Manual.

Objective 1.4 concerns progress with use of equipment and software. Student responses to the ECDS follow-up survey at the end of the third year indicated that student users of computer technology found the equipment and programs to be very helpful (60% to 100% rated individual services as very helpful). These results suggest that students are able to master and effectively use the available technology. Data from staff activity logs collected during sample periods in November, 1987 and April, 1988, however, indicated that a considerable portion of staff activity was related to providing assistance and support to students in the operation of equipment and programs (16% and 9% of staff time respectively). This suggests that while students are able to utilize the technology to effectively complete educational tasks, they may lack competency in the basic operation of equipment and programs and lack the ability to operate the technology independently. This indicates a need for more student training and practice in the basic operation of the program technology than is currently being provided. Complete results of the student survey and staff activity analysis are provided in Section III.

Objectives 1.5, 1.6, and 1.7 concern the summative outcome evaluation of the effectiveness of the Center. Results of these evaluation activities are reported in Section III of this report. The outcome evaluation and the student follow-up survey were completed in June and July, 1988.

Goal 2: Establish Educational Center for Disabled Students

Objectives for Goal 2 concern establishment of the physical aspects of the Center, arrangement of referral/ cooperating agreements and evaluation of activities. The third year objectives for this goal focused on further development of resource materials and evaluation of staff activity and student use patterns for development of replication materials. Third year accomplishments for each objective follow.

Objectives 2.11 and 2.12 relate to the identification of population needs. Individual Intake Needs Assessments have been summarized into a population profile (Appendix J) and are reported in the next section of this report. This profile was updated with information from new 1987-88 students.

Objectives 2.21 and 2.22 concern identification of available equipment and software for establishing the physical aspects of the Center. Assessment activities in this area have resulted in the updating of the Center Bibliography of Information Sources (Appendix K) and the completion of a vendor list for obtaining equipment that is being utilized (Appendix L). Additional assessment activities have involved contact with major manufacturers (IBM and Toshiba), and local dealers to gain information about new developments and product releases. Attendance at the Closing the Gap conference on technology for the disabled was again utilized to observe and test new products presented in vendor displays. Potential new technology has been identified to support information access and reading comprehension consisting of interactive videodisc and large scale CD-Rom data bases. The selection of equipment and software for post-secondary applications and a detailed resource list are provided in the Replication Manual.

Objectives 2.31 and 2.32 concern obtaining equipment and software to meet identified needs. Primary acquisition activities were done during the first year and are reported in the 1985-86 Final Report. Third year funding did not allow significant equipment or software purchase and no additional technology acquisitions were made with grant funds. Other funds were used to purchase an IBM System 2 Model 60 for testing and development of networks and information access systems and two Toshiba T1100 Plus laptop computers for testing of portable workstations and portable

communication devices. The Center has continued to cooperate with vendors and manufacturers in the refinement and upgrading of previously acquired software.

Objectives 2.41 and 2.42 concern identification of other available services and arrangement of working/cooperating agreements. No new services were implemented at the University or in other local agencies during the third year. The existing providers and their services are summarized in Appendix G. The Center's cooperating agreement with the Augmentative Communication Center at the Barkley Memorial Center, University of Nebraska-Lincoln, and the working relationships with State Vocational Rehabilitation, Services for the Visually Impaired, and the University Internship Office were continued. The Center continues to work with State Vocational Rehabilitation for the procurement of personal computer system for students. To-date 8 students have obtained personal computer systems.

Objectives 2.51 and 2.52 are related to evaluation activities. The Center Evaluation Plan was reviewed and updated in September, 1987. The summative evaluation was completed in May, June and July, 1988 (reported in Section III of this report). Formative evaluation activities were conducted throughout the year and are reported in Section III.

Objective 2.6 concerns additional funding and expansion of the Center. During the third year the Center has obtained a grant to conduct a pilot test of an interactive videodisc system and obtained an software loan from IBM of the LS1 authoring and presentation system for creating interactive videodisc programs. A grant to develop and research an information access network for disabled students was obtained from the U.S. Department of Education. The ECDS project is presently being continued by the University of Nebraska-Lincoln with planning underway to establish the Center as a permanent component of Handicapped Services. Work is underway to obtain supplemental financial support from State Vocational Rehabilitation Services and from internal university departments. ECDS staff will continue to pursue grant funds to support services, research and development activities.

Goal 3: Disseminate Model Project Information

Objectives for Goal 3 concern dissemination activities for information sharing and replication. Target activities during the third year were to expand the dissemination audience, develop papers and presentations focusing on replication, increase business community dissemination, and develop a Replication Manual. Details of these activities are provided in Section IV of this report. Accomplishments for each objective follow.

Objective 3.1 relates to publication of the Center Newsletter Outreach. As indicated in the 1986-87 Final Report, Christy Horn, Center Coordinator, assumed chairmanship of the Association on Handicapped Student Service Programs in Post-secondary Education (AHSSPPE) Special Interest Group for computers and the Center newsletter was to be replaced by the SIG newsletter. The SIG was formally established during 1987-88; however, the time lag for establishment of the SIG delayed publication of the SIG newsletter. As a result one final edition of Outreach was published during the third year (Appendix M). The ECDS will begin publication of the SIG newsletter in 1988.

Objective 3.2 concerns compilation of dissemination information and development of dissemination materials. The third year focus in this area has been on development of replication materials and publications and presentations related to these material. Work on the compilation of the Replication Manual and related publications has not been completed; however, the Manual and a series of publications concerning issues in the set-up of computer based services, compensatory technology interventions, assessment, and program evaluation are in progress and targeted to be completed in the spring, 1989. Additional compilation of evaluation data for publication is also in progress. When completed, these publications will provide an extensive literature base for professionals to utilize in providing computer services to disabled students.

Objective 3.3 concerns providing information to other professionals in education and rehabilitation for the purposes of replication and expanding the general knowledge base in the field. Seven third year conference presentations were made during 1987-88. Presentations were made at Closing the Gap (both the 5th and 6th National Conferences), the Technology and Media Division of the Counsel on Exceptional Children, and AHSSPPE meeting the third year goal of expanding presentation to new audiences. Also, five articles have been published or accepted for publication during the third year. Details of third year dissemination activities in this area are provided in Section IV.

Objective 3.4 relates to information sharing with students, parents, school systems, and the community. A article on the Center appeared in the University Student Newspaper and information about the Center is now included in University admissions and reference materials. The Center staff also provided information on the ECDS to clients and staff of the State Services for the Visually Impaired. Center staff now meet with prospective students and their parents as a part of the new student enrollment and orientation process at the University.

Objective 3.5 concerns dissemination to the business/

employment community. Increased business community dissemination was a target area of third year activities. This aspect of dissemination, however, has lagged behind other dissemination activities. As indicated in the 1986-87 Final Report a program brochure was completed by IBM Corporation for distribution to businesses and other post-secondary schools and this dissemination continues. The Center has also continued to work with the IBM Educational System Office, Hotline for the Handicapped for information sharing and referrals. Also, a presentation by Center staff at the Worknet Employment Committee Disability Awareness Seminar in Lincoln was done during October, 1988.

Objective 3.6 deals with the providing of educational/ training opportunities to students in disability related fields though internships. Five students from special education interned or completed practicums and one school psychology student interned in the Center during the third year. Four disabled students were placed in internships in the business community. The Center continues to work with the University Internship Office both for placing interns in the Center and for developing internships for disabled students in the community.

Objective 3.7 concerns development and testing of new advances in technology. The Center has obtained grant for development of an information access network system for physically disabled, visually impaired, and learning disabled students and a grant in progress, in conjunction with the Department of Educational Psychology, the Barkley Memorial Center, and the Nebraska Interactive Videodisc Group at the University of Nebraska, to develop an interactive videodisc program for text comprehension enhancement. Work continues to be done on the evaluation of portable technology for augmentative communication and in-class workstations.

Summary

Third year activities and accomplishments indicate that the Center was successful in achieving its primary third year goals related to providing technology based service to students, developing a technology based Center for disabled students, and disseminating model project information. Third year highlights include:

1. Further evaluation results indicating that Center activities have positively impacted student performance and attitudes (See Section III).

2. Increases in population served and substantial use of Center equipment and services.

3. Formalization of Center assessment procedures and intervention strategies for replication.

4. Completion of evaluation of student use patterns and staff activity patterns and completion of a student follow-up survey.

5. Development of materials for the ECDS Replication Manual.

6. Expanded presentations and publications to new audiences.

C. Adjustments, Changes, Slippages

While substantial progress has been made in realizing all Center Goals, difficulties have been encountered. Issues and changes related to each program goal area will be summarized in this section.

Goal 1: Improve Student Academic Performance

Due to the termination of a project for learning disabled students at the University of Nebraska-Lincoln, the Center had a large increase in the student population served (See Section II). Because of a delay in transferring student records to the Center, many new students were not identified and contacted until well into the school year. As a result, assessment and training activities were delayed. The anticipated offering of formal training classes, therefore, could not be accomplished during the third year. The significant increase in students also hindered on-going training activities because there was no increase in staff to handle the increased student load. Because of the slow identification of students and lack of adequate staffing, assessment and training activities during the third year were not completed as punctually and efficiently as desired. During the third year and for the future, the number of students utilizing the ECDS is too large for one-on-one training to be conducted effectively. While the University will be continuing the ECDS, the set-up process has been slow and final budget and staffing decisions have not been completed; thus, the set-up of more formal training courses will likely be delayed another year.

Goal 2: Establish Educational Center for Disabled Students

Establishment of the ECDS facility was completed in the first and second years as detailed in the 1985-86 and 1986-87 Final Reports. The focus of third year activities was on development of replication materials for establishing similar services in other institutions. These replication materials are currently being produced and will be available in the spring, 1989. There have been no slippages or adjustments in activities related to this goal.

Goal 3: Disseminate Model Project Information

The major barrier to dissemination activities mentioned in the 1986-87 Final Report concerning gaining recognition of the need for information in the area of technology among dissemination populations is beginning to be overcome. A presentation was made at the Technology and Media Division of CEC and three presentations were made at AHSSPPE by center staff. These indicate a growing recognition among relevant professional organizations of the need for information on technology. The major slippage in dissemination has been in the area of business community dissemination activities. The staff has focused on developing replication materials during the third year and as a result, the compilation of business community dissemination materials has lagged. It is hoped that business community dissemination activities can be expanded once replication materials are completed. In other dissemination areas, the objectives are being completed effectively.

Summary

As in previous years, the slippages and adjustments have not necessitated substantial alteration in the initial goals, objectives, and time-lines. Center staff believe that the objectives of the Center have been substantially achieved as originally specified and that the ECDS project has been successful in realizing its goals.

II. Client Population & Environment

This section will provide a summary of student demographics and work with other agencies/organizations. The first section will cover changes in the client population and client needs. The second section will summarize the survey of adjunctive services and cooperating arrangements with other service providers.

A. Demographics and Population Changes

The original number of students enrolling in the Center was 25. The number has progressively increased with 33 students using the Center in January 1986, 43 in June 1986 and 65 in January 1987. In January 1988, 84 students utilized some aspect of the Center's computer and academic interventions. The age of students participating in Center activities ranges from 50 to 18. Demographics and a summary of student utilization are provided in Appendix J.

The number of severely disabled students entering the University is steadily increasing. For the first semester 1988-89 there are 148 students utilizing the Center. Because ECDS services are not widely available, staff anticipate a continued increase in disabled student enrollment as students come to the University of Nebraska-Lincoln to take advantage of the Center. The Center continues to provide an opportunity for severely disabled students to consider post-secondary education as a viable option.

The ECDS is continuing as part of the University Handicapped Services Office. Eligibility criteria for participation in the project is admission to the University and identification as disabled by the Handicapped Services Office. Most physically disabled students using the Center are clients of the Nebraska Department of Rehabilitation Services.

B. Cooperating Agency/Organizations

Center staff have made a concerted effort to form working relationships with resources both within and outside the University. As specified in Center Objective 2.42, the Center attempts to develop cooperating relationships with other area service agencies. Forming a good working relationship with the Nebraska Department of Vocational Rehabilitation and the Nebraska Department of Services for the Visually Impaired has been especially important because of the large number of students involved in the Center who are also clients of one or the other of these agencies. During the third year, Center staff have made a presentation to the Services for the Visually Impaired and provided Center tours to personnel from this agency. As in previous years, staff from Vocational Rehabilitation have toured the Center

and Vocational Rehabilitation now attempts to have all new personnel tour and become familiar with Center services. The Center has continued to provide technical assistance in the purchase of a number of specialized systems for Vocational Rehabilitation clients. The log time and the Center evaluation results have been especially helpful in convincing Vocational Rehabilitation to purchase systems for clients. There have also been students using the Center who had originally been turned down by Vocational Rehabilitation as high risk students who are now receiving benefits as a result of their performance.

Cooperation with the Augmentative Communication Center at Barkley Memorial Center provides the Center with expert evaluation facilities for some of the more severely disabled clients especially those with speech problems. The Educational Center in turn provides opportunities for students to see actual technological applications. This working relationship is in the process of being further formalized within the University system.

The Center conducts an annual survey of adjunctive services (Objective 2.21) to identify potential referral sources and cooperative agencies. Results of the 1987-88 survey are provided in Appendix G.

III. EVALUATION REPORT

Center evaluation activities encompass both formative evaluation to provide input for change and enhancement of Center activities, and summative evaluation to provide outcome data on the success of Center activities as specified in Evaluation Plan Objective 2.52. This section will provide results from summative and formative evaluation activities for the third year.

A. Summative Evaluation Activities

Evaluation Plan Objectives 1.5, 1.6, and 1.7 provide for outcome evaluation of student educational progress, progress in student writing, and change in student attitudes and perceptions concerning school. The Summative Evaluation Plan (Appendix D) specifies the areas of assessment related to each objective. The third year summative evaluation was conducted in May and June, 1988. For the third year evaluation only the evaluation of educational progress (Objective 1.5) and the evaluation of student attitudes and perceptions (Objective 1.7) were completed. The evaluation of writing (Objective 1.6) was discontinued as discussed in the 1986-86 Final Report.

In this section, results of the evaluation of educational progress (Objective 1.5) will be discussed. Results for the evaluation of student attitudes (Objective 1.7) will be discussed in Section C. An initial overview of methodology and design will be provided. Next, summative evaluation outcomes will be presented for each objective as specified in the Summative Evaluation Plan. (Appendix D). For each objective, additional methodology considerations and results will be provided. Following the summary by objective an overall discussion of results will be provided.

General Methodology and Design Considerations

The focus of the initial Center evaluation, conducted during the second year, was on establishing if there was a positive effect of Center services on student academic achievement. Findings from this evaluation, reported in the 1986-87 Final Report, indicated that students receiving Center services for their entire time in college had higher grades, fewer instances of academic probation or suspension, and more frequently passed all of their attempted credit hours than students attending prior to the start of the Center. Additionally, the initial student population of the Center showed an increase in grades during the time of Center operation. These finding indicated a positive effect on student performance related to having Center services.

The focus of the third year evaluation was on determining whether these identified gains could be

replicated with a new student sample and whether initial improvements were maintained. To examine these questions, a multiple methods and measures approach was taken to evaluating academic outcomes. Three population samples were used in the evaluation. The first sample was the original student population at the initiation of the ECDS. This group was used to represent the performance of disabled students at the University prior to the start of Center services. The second sample consisted of those students who entered the University during the spring of 1985 or the fall of 1986. These students were the first group receiving ECDS services for their entire time in college. The third sample consisted of those students entering the University during the spring of 1986 and fall of 1987. This sample constituted the second group of students receiving ECDS services during their entire time in college.

These samples do not contain all students receiving ECDS services. Graduate students were eliminated from analysis due to different grading practices at the graduate level at the University. Because previous findings indicated that the effects of Center services were different for new students and for students who had been attending the university for substantial periods before receiving services, students who entered the ECDS from the termination of a learning disabled student program, all of whom had been attending the University at least 1 year, were eliminated to avoid confounding the analysis. Also, many of these students, as previously discussed, were not identified and evaluated until well into the third year; thus, many of them did not receive full Center services during the third year.

As in the first evaluation, an independent between group comparison was used to compare new third year students to the original student population to again assess whether disabled students entering the university since the establishment of the Center perform relatively better than disabled students who were at the university prior to the establishment of the Center. For all of these tests the performance of the new students group for the fall semester 1987-88 was compared to the performance of the original student group for the fall semester 1985-86. The third year student group was also compared to the second year student group to determine if the relative performance of these groups, who both received Center services during their entire time in college, was similar. For all of these tests the performance of the third year new students group for their first semester (fall 1987-88) was compared to the performance of the second year new student group for their first semester (fall 1986-87). In these tests, a *t*-test was used for parametric data (e.g., grades) and a Chi-square test was used for frequency data (e.g., frequency of probation). A significance level of .05 was used for all between group tests.

The performance of disabled students was, in selected cases, compared to the performance of the general student population. The purpose of these assessments was to determine if disabled student performance was approaching or within the range of average university student performance. The designs utilized were a one-sample t - test with the performance of all university students was treated as a population value and the performance of all disabled students treated as a sample value for grades and a Chi-square goodness of fit test for probation/suspension frequency. For these tests the sample used was the entire student population of the ECDS for the fall and spring 1987-88 semesters. Since it was hoped that disabled student performance would not be significantly different, these tests constituted an attempt to prove the null hypothesis of no significant difference. In this case significance levels should be set so that rejection of the null hypothesis is relatively easy, since it is more important to guard against a false acceptance of the null hypothesis than a false rejection. Therefore, a significance level of .30 was established based on general guidelines for goodness of fit type tests.

To assess maintenance of initially identified gains, two types of tests were conducted. First, the third year performance of all students who entered after the start of the Center (combined second and third year students) was compared to the performance of disabled students prior to the start of the Center (initial student population). These tests were conducted like the previously described between group tests with the performance of the combined second and third year groups for the fall and spring 1987-88 semesters compared to the performance of the initial student population for the fall 1985 semester. For these tests a significance level of .05 was used. Second, to assess maintenance of GPA improvement a Kolmogorov-Smirnov goodness of fit test was conducted to compare the distribution of cumulative GPA for Center students for the fall 1986 through spring 1988 semesters to a uniform distribution. Because the first evaluation had established that new students grades were higher than students attending prior to services and that prior students grades improved to levels roughly equivalent to those of new students during the first three semesters of Center operation, the Kolmogorov-Smirnov test examined whether cumulative GPA of all students in subsequent semesters was equivalent to that obtained in the fall 1986 semester.

Results

Objective 1.5.1 - Reduce drop-out rate for disabled students to levels equivalent to non-disabled student population.

This objective was established based on data from the initial literature review in the original grant supporting a belief that disabled students are at greater risk for dropping out and that an inordinately higher number of disabled students do not complete their university education. Since the Center is designed to impact academic success, a more pertinent measure of academic risk than drop-out rate, which may be due to non-academic reasons such as financial or personal considerations, is percentage of students on academic suspension or probation. It is those students with academic problems that are most at risk of dropping out, therefore, a reduction in students having academic problems should ultimately reduce the drop-out rate.

In the second year evaluation, the drop-out rate of students in the initial population of the Center was found to be consistent with the general drop-out rate of freshman students at the University over three semesters (30%). In this evaluation the drop-out rate of the fall 1986 new students was assessed by calculating the percent of these students who left the university during the three semesters following their initial enrollment. During the fall 1986, spring 1987, and fall 1987 semesters, six (6) of the original 20 students in this group left the university. This was a drop-out rate of 30% which is equivalent to the University wide drop-out rate for entering students across three semesters of 30%.

To assess change in students on academic suspension or probation, contingency table analysis (Chi Square) was conducted comparing the frequency of students on academic suspension or probation for new third year students during the fall 1987-88 semester to the frequency of students on academic suspension or probation for the original student population during the fall 1985-86. The suspension/probation rate for new third year students was also compared to the first semester suspension/probation rate of the second year new students (fall 1986 semester).

The contingency tables for the between groups test are presented below:

	Not on Probation	On Probation	Total
1985 Students	15	13	28
1987 Students	14	2	16
Totals	29	15	44

The difference between the new third year students and the original 1985 student population was significant $\chi^2 = 5.22$, $p = .02$.

	Not on Probation	On Probation	Total
1986 Students	17	3	20
1987 Students	14	2	16
Totals	31	5	36

The difference between the new third year students and the second year new student population was not significant $\chi^2 = .046$, $p = .83$.

The results of between groups tests of students on suspension and probation indicate that third year new students, like second year new students, have significantly fewer instances of suspension/probation than the original 1985 student population. Third year student suspension/probation frequencies do not, however, differ from the second year new students. These findings support the findings of the first evaluation that students having Center services experience significantly fewer instances of suspension or probation than students not receiving these services.

To examine the overall suspension and probation frequencies of students entering the university since the start of the ECDS, the suspension/probation frequency of all second and third year new students for the fall and spring 1987-88 semesters was compared to the frequency of students on academic suspension or probation for the original student population during the fall 1985-86. The contingency tables for these tests are presented below:

	Not on Probation	On Probation	Total
1985 Students	15	13	28
New Students (Fall 1987)	25	5	30
Totals	40	18	58

The difference between the new students and the original 1985 student population was for the fall 1987 semester was significant $\chi^2 = 5.99$, $p = .01$.

	Not on Probation	On Probation	Total
1985 Students	15	13	28
New Students (Spring 1988)	20	7	27
Totals	35	20	55

The difference between the new students and the original 1985 student population for the spring 1988 semester was not significant $\chi^2 = 2.50$, $p = .11$.

To examine whether the frequency of disabled students on academic suspension or probation exceeds University wide averages, The frequency of disabled students on suspension or probation during the fall 1987 and spring 1988 semesters was compared to the expected frequency based on University wide averages using a 1 X 2 contingency table analysis with a Chi-square goodness of fit test. Results are reported in the tables below.

		Not on Probation or Suspension	On Probation or Suspension
Fall 1987 Semester	Expected Frequency	34	7
	Disabled Frequency	34	7

The results indicate that for the fall 1987 semester the frequency of suspension and probation for disabled students fit the normal University wide frequency (χ^2 = 0.0, p = 1.00).

		Not on Probation or Suspension	On Probation or Suspension
Spring 1988 Semester	Expected Frequency	32	6
	Disabled Frequency	28	10

The results indicate that for the spring 1988 semester the frequency of suspension and probation for disabled students did not fit the normal University wide frequency (χ^2 = 3.17, p = .08). While the Chi-square value is not significant at the .05 level, the probability is less than the goodness of fit criteria of .30. Thus, while disabled students during the spring 1988 semester do not strongly differ from the University norm, they do not statistically fit the expected University frequency either.

The results of the comparison of all students entering the University since the initiation of Center services to the students attending prior to the start of the Center and the results of the comparison to University wide suspension and probation frequencies provide a somewhat contradictory picture of Center effects. During the fall 1987 semester, the results show that new students have significantly fewer instances of suspension/probation than students attending prior to the start of the Center and that the suspension/ probation rates of all Center students are within University norms. These findings confirm the finding that, like second year new students, third year new students have significantly fewer instances of suspension/probation than students attending prior to the start of the Center and the conclusion that Center services have a positive effect on lowering

suspension and probation rates. The results for the spring 1988 semester, however, show that the combined group of second and third year new students no longer had statistically fewer instances of suspension and probation than original students and that the suspension probation rates of all Center students were no longer within University norms.

It is not clear why the performance of disabled students during the spring 1988 semester was poorer than that exhibited in other semesters of Center operation. Visual inspection of the raw suspension/probation rates would suggest that disabled students are still performing better during the spring 1988 semester than prior to the start of the Center. Students entering since the Center began had 26% rate for the spring 1988 semester versus the 46% rate for students prior to the Center. Also, while the suspension/ probation frequencies for disabled students did not meet goodness of fit criteria for being within University norms, the difference was not as large as for original students who were highly significantly different from the University norm (see 1986-97 Final Report). When examined in light of other findings on suspension and probation in the first evaluation and the present evaluation, the best explanation may be that the findings during the spring 1988 semester represent a random fluctuation in performance, particularly since the small sample sizes in the evaluation make the results sensitive to relatively small changes in the suspension/ probation frequencies. The spring 1988 results, however, may also indicate that there is a limit on how much technology based services can affect academic achievement. The primary technology intervention used by students has been for writing and while this intervention may improve written communication, this is not the only aspect of class performance that may be adversely affected by disability. Thus, these findings could indicate a need to expand technological interventions to impact on more aspects of the curriculum.

Overall the results of all analyses support the conclusion that students receiving Center services experience fewer instances of suspension or probation. The spring 1988 results, however, suggest that continued tracking of students is needed to fully determine the magnitude and continuity of effects related to Center services.

Objective 1.5.2 - Increase percentage of disabled students admitted to the University.

There are no statistical evaluations related to this objective. Analysis of student demographic data reported in Section II, however, shows that there has been a steady increase in disabled students being served by the Center. During the fall 1988 semester, there were 143 students served

by the Center compared to 25 during the first semester of Center operation (fall 1885). Not all of this increase has been through new enrollments as students who were previously attending have begun to use Center services. However, the new student enrollment has been running between 15 and 20 per year during the time of Center operation and based on contacts made with parents and perspective students, these enrollment trends are expected to continue. While enrollment numbers as a percentage of overall freshman enrollment remain small, these are a substantial increase over pre-Center enrollments of under 10 per year. It, therefore, does appear that the existence of the Center has been a factor in increasing disabled student enrollments at the University.

Objective 1.5.3 - Increase overall grade average for students in the Center.

As indicated in the general methodology section, comparisons were conducted examining the first semester performance of third year new students to the performance of students prior to the start of the Center and to the first semester performance of second year new students. These were between group comparisons conducted by comparing the GPA of third year new students (semester and overall) for the first semester 1987-88 to the GPA (semester and overall) of the original student population for the first semester 1985-86 and to the GPA (semester and overall) of the second year new students for the first semester 1986-87.

Results of the independent t - tests for the between groups comparisons are summarized in the following tables.

	Original 1985 Students		New 1987 Students				
	Mean	S.D.	Mean	S.D.	t Value	D.F.	Sig.
Semester GPA	2.20	.86	2.63	.69	-1.71	42	.094
Cumulative GPA	2.27	.75	2.62	.68	-1.55	42	.128

These results indicate that both the semester and cumulative GPA of new third year students are not significantly higher than the semester and cumulative GPA of students attending prior to the establishment of the Center.

	1986 Students		New 1987 Students				
	Mean	S.D.	Mean	S.D.	t Value	D.F.	Sig.
Semester GPA	2.80	.89	2.63	.69	.61	34	.546
Cumulative GPA	2.77	.69	2.62	.68	.67	34	.509

These results indicate that both the semester and cumulative GPA of new third year students are not significantly different from the semester and cumulative GPA of second year new students in their first semester.

Results of the between group analysis of grades for new third year students indicate that the semester and cumulative GPA of these students did not significantly differ from either students attending prior to the start of the Center or second year new students receiving Center services for their entire time in college, although the GPAs of original and second year new students were found to significantly differ in the first evaluation (see 1986-87 Final Report). These type of results, where a group does not significantly differ from either of two groups who do significantly differ, are difficult to interpret. Essentially, no firm conclusion can be drawn about whether the grades of third year students are better than those of students attending prior to the start of the Center. Visual inspection of the mean GPAs suggests that third year new students are doing better than students prior to the start of the Center and are more similar to the second year new students than the original students, however, this cannot be statistically confirmed in the between group analysis.

A further examination of differences between the grades of students attending since the start of Center services and students attending prior to Center services was conducted by combining all second and third year students and comparing their grouped performance to the original student group for the fall 1987 and spring 1988 semesters. The results of independent *t*-tests for cumulative GPA for these semesters is provided in the following table.

	Original Students		Combined 86-87 Students				
	Mean	S.D.	Mean	S.D.	*t* Value	D.F.	Sig.
Fall 1987 GPA	2.27	.75	2.71	.69	-2.34	56	.023
Spring 1988 GPA	2.27	.75	2.65	.65	-2.01	53	.050

These results indicate that during the fall 1987 semester, the cumulative GPA of students attending since the start of Center services was significantly higher than that of students attending prior to the start of Center services. During the spring 1988 semester, the cumulative GPA of students attending since the start of the Center was different from that of students attending prior to Center services at exactly *p* = .05. This significance level can be interpreted as indicating significance if the alpha level is interpreted as .05 or less. It is not significant, however, if a strict criterion of less than .05 is applied. Given the

field context of the evaluation, it seems reasonable to adopt the less strict interpretation and conclude that the .05 probability obtained represents a significant difference. Thus, in both semesters, students receiving Center services for their entire time in college have significantly higher GPAs than students attending without Center services.

These results clarify somewhat the between group findings comparing third year new students to the original student group and second year new students that showed third year students did not significantly differ from either original or second year new students. As indicated previously, visual inspection of the data suggested that third year students were more similar to second year students than to original students. The findings that the combined second and third year students had a significantly higher GPA than original students for both 1987-88 semesters would indicate that the interpretation of second and third year students being similar is reasonable. The overall conclusions from the tests of GPA are that students having Center services for their entire time in school have higher academic achievement, however, the magnitude of this effect may differ for different specific groups of students.

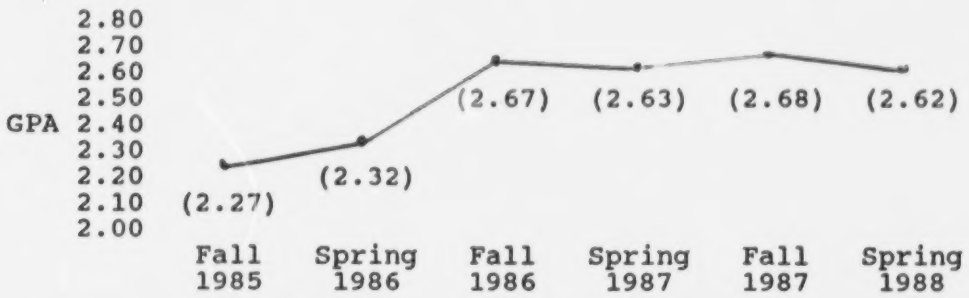
The first year evaluation of grades (1986-87 Final Report) indicated that students receiving Center services from the start of their time in college had significantly higher GPAs and that students attending prior to the start of the Center showed improvement in grades over the first three semesters of Center operation to levels approximately the same as students entering after the Center began. These findings indicate that the effects of Center services on improving GPA are realized immediately for students receiving these services on entry to college and are likely realized within the first year for students who were previously attending. Based on these findings, it is not realistic to expect GPA to improve each semester indefinitely. It is more relevant to assess whether the improvements identified maintain over time. Essentially, the most likely expectation is that students' grades should remain relatively constant and not dramatically increase or decrease once the gains related to Center services have been realized.

For the student samples in the ECDS evaluations, the test of consistent grades across semesters cannot be done with common repeated measures tests. The sample sizes for groups are small initially and with attrition across semesters they become quite small. Since the hypothesis of interest would be a prediction of no change in grades across semesters, the test becomes essentially a test of the null hypothesis of no significant difference. Even with a goodness of fit significance level of .30, small sample sizes dramatically increase the probability of finding no significance. Thus, there is a bias, with small samples, in

proving the hypothesis when the hypothesis predicts no increasing or decreasing trend or significant differences between semesters.

To overcome the problem of sample size bias, maintenance in grades was tested using a Kolmogorov-Smirnov Goodness of Fit Test. This tests examines whether a sample distribution fits a specified distribution. If it is assumed that student grades will remain constant once Center effects are realized, then the distribution of grades across semesters should be uniform. The Kolmogorov-Smirnov Test was conducted by calculating the average cumulative GPA of all students in the Center for each of the six semesters of Center operation. The distribution of these average GPAs was then compared to a uniform distribution using a goodness of fit significance level of .30. Two test were conducted. First, the pattern of GPAs across all six semester was tested. Since the mean GPA of students was improving during the first three semesters, the distribution of grades for all six semesters should not fit a uniform distribution. This test was done to verify the power of the Kolmogorov-Smirnov Test to identify a real difference from uniformity. The second test was conducted examining only the last four semesters of Center operation (Fall 1986 - Spring 1988). Results of the first evaluation suggested that by the Fall 1986 semester GPA for both new students and original students had achieved a level where further increase was not expected. Thus, examination of the grades across the semesters subsequent to the Fall 1986 semester would determine if grades were maintaining.

Average cumulative GPA for students during each of the six semesters of Center operation are provided in the following table.



Results of the Kolmogorov-Smirnov Test for all six semesters showed that the distribution of GPAs did not fit a uniform distribution at the .30 significance level (Difference = .539, $p = .06$). Results of the Test for the fall 1986 through spring 1988 semesters showed that the distribution of GPAs for these four semesters fit a uniform distribution at the .30 significance level (Difference = .423, $p = .47$). These results indicate that following the initial gains in

GPA for the original student population during the fall 1985 through fall 1986 semesters, the combined GPA of all students has remained constant over the last four semesters of Center operation. These findings suggest that students using Center services are able to maintain initially achieved GPA levels.

An additional examination of disabled student academic performance was done by comparing the cumulative GPA of all disabled students currently enrolled in the Center during the fall 1987-88 semester to the average University wide GPA. Comparison was done utilizing a 1-sample t - test.

	University Population	Disabled Students				
	Mean	Mean	S.D.	t Value	D.F.	Sig.
Cumulative GPA	2.95	2.68	.649	2.67	40	<.05

Results of the comparison to the University wide average GPA, show that disabled student cumulative GPA is significantly lower than University wide average GPA at the .05 level.

Overall the results of the evaluation of grades indicate that Center services are somewhat effective in improving academic achievement. Results show that students entering since the start of the Center as a group have significantly higher GPAs than did students attending prior to the start of the Center. Results also show that the improved grades of the initial student population and the initially significantly higher grades of students entering since the start of the Center maintain over a two year period. While encouraging, these positive results must be tempered by the findings that third year new students when examined as a group did not have significantly higher performance than the original student population and findings that disabled student GPA remains significantly lower than the University wide average GPA. Even with these somewhat negative findings, the overall results of this evaluation when combined with the initial evaluation during the second year (1986-87 Final Report) suggest that the existence of Center services has a positive impact on student academic achievement. The findings that GPA for all students maintains at a level significantly higher than the GPA of disabled students prior to Center operation but lower than the University average GPA suggest that the positive impact of technology services while beneficial cannot in itself eliminate all performance difference between disabled and non-disabled students. This indicates that further development of a greater range of technological interventions and support services is needed to further close the gap between the grades of disabled and non-disabled students.

Objective 1.5.4 - Increase semester credit hour load to levels equivalent to non-disabled student population.

As a result of the initial evaluation during the second year (1986-87 Final Report), it was determined that restrictions on number of courses taken necessitated by non-academic aspects of disability limited the course loads of disabled students to levels below that of non-disabled students and that increasing credit loads to the average University level was likely not desirable. The better indicator of performance was determined to be the percentage of students successfully completing all credit hours attempted. As a result of these initial findings, the third year evaluation examined only the successful completion of attempted credits.

To assess the percentage of students successfully completing all credits attempted contingency table analysis (Chi Square) was conducted comparing the frequency of students completing 100% of attempted for new third year students during the fall 1987-88 semester to the frequency of students completing 100% of attempted credits for the original student population during the fall 1985-86. The frequency of passing 100% of attempted credits for new third year students was also compared to the first semester frequency of passing 100% of attempted credits of the second year new students (fall 1986 semester).

The contingency tables for the between groups tests are presented below:

	Passed 100%	Not 100% Passed	Total
1985 Students	12	16	28
1987 Students	14	2	16
Totals	26	18	44

The difference between the new 1987 students and the original 1985 student population was significant $\chi^2 = 8.391$, $p = .009$.

	Passed 100%	Not 100% Passed	Total
1986 Students	17	3	20
1987 Students	14	2	16
Totals	31	5	36

The difference between the new third year students and the

second year new students during their first semester was not significant $\chi^2 = .046$, $p = .829$.

The results of between groups tests for passing 100% of attempted credits indicate that third year new students, like second year new students, have significantly greater frequency of passing all attempted credits than the original 1985 student population. Third year student frequencies of passing all attempted credits do not, however, differ from the second year new students during their first semester. These findings support the findings of the first evaluation that students having Center services have significantly greater frequency of passing 100% of attempted credits.

To examine the overall frequency of passing 100% of attempted credits for students entering the university since the start of the ECDS, the frequency of passing all credits by all second and third year new students for the fall and spring 1987-88 semesters was compared to the frequency of passing all attempted credits by the original student population during the fall 1985-86. The contingency tables for these tests are presented below:

	Passed 100%	Not Passed 100%	Total
1985 Students	12	16	28
New Students (Fall 1987)	21	9	30
Totals	33	25	58

The difference between the new students and the original 1985 student population was for the fall 1987 semester was significant $\chi^2 = 4.35$, $p = .04$.

	Passed 100%	Not Passed 100%	Total
1985 Students	12	16	28
New Students (Spring 1988)	17	10	27
Totals	29	26	55

The difference between the new students and the original 1985 student population for the spring 1988 semester was not significant $\chi^2 = 2.23$, $p = .14$.

The results of the comparison of all students entering the University since the initiation of Center services to the students attending prior to the start of the Center like the evaluation of suspension and probation rates provide a somewhat contradictory picture of Center effects. During the fall 1987 semester, the results show that new students have significantly higher frequencies of passing 100% of attempted

credits than students attending prior to the start of the Center. These findings confirm the finding that, like second year new students, third year new students have significantly higher frequency of passing all attempted credits than students attending prior to the start of the Center and the conclusion that Center services have a positive effect on increasing the frequency of passing all attempted credits. The results for the spring 1988 semester, however, show that the combined group of second and third year new students no longer had statistically higher frequency of passing all attempted credits than original students.

It is not clear why the performance of disabled students during the spring 1988 semester was poorer than that exhibited in other semesters of Center operation. Visual inspection of the raw frequencies of passing all attempted credits would suggest that disabled students are still performing better during the spring 1988 semester than prior to the start of the Center. Sixty-three percent of students entering since the Center began passed all attempted credits during the spring 1988 semester versus a 43% rate of passing all attempted credits for students prior to the Center. When examined in light of other findings on successful completion of attempted credits in the first evaluation and the present evaluation, the best explanation may be that the findings during the spring 1988 semester represent a random fluctuation in performance, particularly since the small sample sizes in the evaluation make the results sensitive to relatively small changes in the frequencies of passing all credits. The spring 1988 results, however, may also indicate, like the results for suspension and probation, that there is a limit on how much technology based services can affect academic achievement. Thus, these findings could indicate a need to expand technological interventions to impact on more aspects of the curriculum.

Overall the results of all analyses support the conclusion that students receiving Center services have a higher frequency of passing all attempted credit hours. The spring 1988 results, however, suggest that continued tracking of students is needed to fully determine the magnitude and continuity of effects related to Center services.

Discussion

Results of summative evaluation activities indicate that the Center has had a positive effect on disabled students participating in Center activities. The primary effect has been an overall improvement in academic performance as indicated by significantly fewer instances of suspension/ probation, significantly higher cumulative GPA, and significantly higher frequency of passing all attempted credit hour for students who received Center services for their entire time in college compared to students attending

prior to the start of the Center. These findings indicate that the Center is positively affecting the academic success of disabled students at the University and suggest that the intervention and service approach taken by the Center are effective in meeting the needs of disabled students in the academic environment. While these conclusions seem warranted, caution must be exercised in assuming that initiation of Center type services will necessarily improve student performance. Findings that third year new students did not have significantly higher GPA than students prior to the start of the Center and that suspension/probation frequency and frequency of passing all attempted credit hours during the spring 1988 semester were not significantly different than for student before the start of the Center suggest that there are limits on the magnitude of effect that can be realized by Center type interventions. Results of the analysis of GPA consistency, however, indicated that there is reason to expect any improvements that are achieved will maintain.

The results obtained, provide evidence that the Center program can be beneficial if replicated in other post-secondary settings. Center activities and interventions are organized around readily available equipment and software and have been defined in enough detail to be implemented by other sites. It is the belief of Center staff that the evaluation results obtained provide evidence that the Center is successful as a model demonstration project.

B. Formative/Process Evaluation Activities

Formative evaluation activities are summarized in the Center's Formative Evaluation Plan (Appendix A). Objectives 2.51 and 2.52 specifically specify that the Center will develop and update an evaluation plan and conduct semi-annual evaluations of activities. Summative outcome evaluation results were presented in the previous section. This section will document and describe formative process activities and results.

1. Process Evaluation Activities

Process evaluation activities are designed to document and assess existing program activities. The purpose of this evaluation is to determine implementation of program services and completion of defined program tasks. Process evaluation is conducted on each of the three goals of the Center. These will be summarized in this section.

Goal 1

Center Goal 1 is to improve student academic performance. Process areas evaluated under this goal are completion of assessment activities, types and levels of interventions provided, and staff activities related to assessment and training. Main process evaluation questions concern what assessments are required, what types and levels of training are needed based on student use of the Center, and what levels of staff involvement are needed to implement assessment and training activities. Primary instruments utilized to examine assessment and training processes are the Center's Needs Assessment and student activity logs.

Assessment needs were identified and instruments were developed during the first year leading to the development of the IPO Model as described in the 1985-86 Final Report. Second year activities were directed at continuing to refine existing instruments and determine additional assessment needs. During the third year, a supplemental assessment for students with learning disabilities was developed in conjunction with an area clinical psychologist. This was done because existing assessment procedures did not provide enough detail on the exact nature of the student's learning disability to allow targeting of the Center's technological or skill training interventions. All assessment procedures are provided in the ECDS Replication Manuals.

Training activities were initially evaluated in relation to student needs identified in the needs assessment and a survey of existing equipment and software. The initial identified interventions were grouped into technological, skill training, and adaptive intervention strategies (Appendix I) as detailed in the 1985-86 Final Report. Under

Objectives 2.11, 2.12, 2.21 and 2.22 Center staff have continued to assess student needs and available equipment and software. These activities have identified the major types of student needs that can be met through technology and skill training with existing equipment and software. The uses and purpose of each intervention and the appropriate population are provided in Appendix I.

During the third year, a more detailed student use log was kept for a one month (April, 1988) sample period. The logs provided information on amount of time students use the Center and their activities. For purposes of the evaluation student use was organized by three categories (a) use of computer based technological interventions, (b) use of skill training interventions and other academic support, and (c) use of traditional disabled student services (e.g., registration, alternative testing services, building access services, etc.). Of interest in this evaluation is the relative use of services unique to the project, the technological and skill training interventions, compared to the use of traditional disabled student services.

Summary results of the use logs indicated that total student use of the Center during the sample period for the three evaluation categories was 232.82 hours. By category the breakdown was (a) use of computer technological interventions - 121.65 hours, (b) use of skill training/academic support interventions - 40.59 hours, and (c) use of traditional services - 70.58 hours. The total use of uniquely Center services, technological and skill training/academic, was 162.24 hours accounting for 70% of the total Center use time compared to 70.58 use hours of traditional services accounting for 30% of total Center use time. Student use patterns indicate, therefore, that students make substantial use of ECDS services and that students primarily use the available technological and skill training interventions, rather than traditional disabled student services. These findings indicate that students will make use of technological and skill training interventions if these are available and sufficient training is provided to allow students to use the interventions successfully. This indicates that training activities must be made a part of any program hoping to implement technology and skill training interventions.

In addition to assessment of student activities, there is a need to identify staff activities related to assessment, training, and support. Student use patterns, as previously discussed, indicate that students will utilize technological and skill training interventions if these are made available. The use of these interventions, however, requires that students be trained to operate the computer interventions and be trained in associated skill areas. There is also a need for ongoing staff support to assist students in utilizing the

computers and assist students in academic areas. To determine the extent of staff training and support activities, staff kept logs of their student interactions during sample periods in November, 1987 and January, 1988. Staff activities were grouped into five categories (a) computer support - consisting of direct assistance in computer or program operations (e.g., booting, changing disks, setting up equipment, etc.), (b) computer training - consisting of time spent in specific training activities related to computer or program operation, (c) academic support - consisting of direct assistance to students in academic areas (e.g., proofreading, tutoring, helping students review, etc.), (d) academic training - consisting of skill training activities in academic areas (e.g., training in notetaking, teaching the cognitive skills course, training in writing, etc.), and (e) traditional services - consisting of general disabled student support services (e.g., registration assistance, administering tests, arranging notetakers, etc.). Of interest in this evaluation were (a) the relative time spent on training versus direct support and (b) the relative time spent in uniquely ECDS activities (computer and academic training and support) versus the time spent in providing traditional services.

Staff interactions with students totaled 95.29 hours during the 18 day November sampling period and 49.38 hours during the 10 day January sampling period. The daily and weekly average contact hours were 5.29/day and 26.45/week for November and 4.94/day and 24.7/week for January. These totals indicate that approximately .66 full time equivalent staffing is required to handle student contact for the five logged areas. The logged hours and the percentage of total logged hours for each activity category were as follows:

	November		January	
Activity Category	Hours	Percent	Hours	Percent
Computer Support	15.70	16%	4.69	9%
Computer Training	7.26	8%	9.52	19%
Academic Support	22.12	23%	12.82	26%
Academic Training	13.75	14%	3.00	6%
Traditional Services	36.46	38%	19.35	39%

Computer and academic training accounted for 22% of the November and 25% of the January staff interaction time while computer and academic support accounted for 39% of the November and 35% of the January staff interaction time. This indicates that staff spend relatively more time engaged in ongoing support than in specific training activities. The need for support activities is related to how independently students can use the computer interventions and do academic skills. The relatively high amount of time spent in support activities relative to training suggests that students are not being trained to the point of achieving full

independence. This supports a need for more systematic training activities to develop higher skill levels among student users of the Center. Examination of computer support and training for the two sample periods indicates that staff spent a higher percentage of time in training than in support during January and a higher percentage of time in support than in training during November. The January sample period was at the start of a semester while the November sample period was during the middle of a semester. The different time allocations to computer training and support during the sample periods indicate that at the start of a semester, when new students are coming to the Center for services, staff are allocating the most time to training activities; however, once the semester is underway training activities decrease relative to support. The results of these analyses of training and support activities suggest that (a) although staff are doing training activities early in the semester, a greater amount of training is needed, and (b) that training activities need to be maintained throughout the semester, perhaps by including training components during support activities so that support activities can be faded out over time.

The percentage of staff time spent on ECDS computer and academic services compared to traditional services was 61% to 38% in November and 60% to 39% in January. These percentages indicate that staff is involved primarily in activities related to ECDS computer and academic interventions, rather than in providing traditional services. This suggests that if computer and skill training interventions are going to be provided, the need for staffing will increase. Based on the staff activity time, an additional staffing of approximately .50 full time equivalent [.40 for November, .37 January] is required to deliver support and training services related to ECDS interventions at third year student use levels. Examination of the traditional services provided indicated that the most time consuming traditional services were supplying reading, writing, and library support [e.g., reading tests, typing dictated test answers or homework assignments, finding library materials]. This indicates a continued need to develop more fully the information accessing interventions involving data base networking and interactive videodisc being pilot tested by the ECDS to provide alternative computer based presentation of materials to replace readers and alternative methods of information access. The continued use of staff to do typing indicates a need to expand training in computer based writing interventions so that students are sufficiently skilled to complete a wide range of writing activities without the need for staff support.

Goal 2

Center Goal 2 is to establish the physical aspects of

the Educational Center and its services. Process areas evaluated for this goal are assessment of population needs (Objectives 2.11, 2.12), identification and obtaining of equipment and programs (Objectives 2.21, 2.22,) and identification of adjunctive services and arrangement of cooperative agreements (Objectives 2.41, 2.42). Process activities related to these objectives concern developing a general disability needs profile, updating resource materials and surveying potential adjunctive services. Process concerns are that information sources in these areas be updated on a systematic basis. To meet these updating needs, the Evaluation Plan specifies a semi-annual updating of population profiles and equipment and software materials and an annual update of adjunctive services. The main process goal for the third year was the finalization of these information sources for the ECDS Replication Manuals.

The first process activity during the third year was updating the student population needs. Each semester, Student Needs Assessments are to be combined to develop a Center population profile of disability types and technological and educational needs. The population profile is used to summarize the needs of current students and to examine trends or new need areas that must be addressed. As indicated in Section II, there was a significant increase in the student population of learning disabled students resulting from the termination of a learning disabled student program and the transfer of students to the ECDS. Because student records were not transferred in a timely manner, the completion of student assessments was delayed resulting in a delay in the compilation of the needs profile (see Adjustments and Slippages in Section I). As a result, it was not until the second semester that a needs profile could be developed so only a single update was accomplished. Population characteristics were discussed in Section II and Appendix J contains the latest update of demographics.

The second process activity during the third year was updating the Bibliography of Information Sources (Appendix K) for equipment and software (Appendix K) and the Vendor List (Appendix L). These sources were updated as new products were identified and obtained throughout the year. These references are required for replication projects needing to find available technology. Both the bibliography and vendor list are included in the ECDS Replication Manuals

Updating of adjunctive services was completed in the Spring, 1988 semester, through a survey of University and local services. No new services were identified during the third year. Work is underway, however, to formalize arrangements for the continuation of the Center following the end of the Grant period and establish formal cooperative agreements with adjunctive service providers. Results of this survey are provided in Appendix G. The listing of

available adjunctive services provides information for potential referrals and auxiliary services that may be identified in student needs assessments.

Goal 3

Goal 3 concerns development of model project information and dissemination of program findings. Process evaluation areas for this goal involve compiling and updating dissemination materials (Objective 3.2) and completing dissemination activities related to the dissemination objectives (3.3, 3.4 and 3.5). Process concerns are that materials are completed on a timely basis and that response is made to dissemination opportunities. The primary third year activity under this goal has been the preparation of materials for the Replication Manuals.

The process goal for updating dissemination material is that all materials will be reviewed and compiled on a semi-annual basis. During the third year, this process has been intensive as materials were compiled for the completion of Replication Manuals and other dissemination outlets. These activities are further detailed in Sections IV and V. The updating of dissemination material and data collection for third year activities is complete and final products are being prepared for distribution in the fall of 1988 and spring of 1989.

Center activities in the area of exploring dissemination opportunities have involved attempts to expand the dissemination audience to previously unreached populations. During the third year, Center staff have expanded presentations to include the Council on Exceptional Children and greater participation at the AHSSPPE conference. Also, a presentation to the business community through a local business organization was conducted during the fall of 1988. Details on these activities are contained in Section IV of this report. The range of dissemination pursued during the third year indicates that staff have been successful in identifying and responding to available dissemination opportunities.

2. Program Development Activities

Program development activities are directed at gaining information for refinement of program services and development of new services. These activities broadly relate to the context of the Center as a model demonstration project with the primary purpose of generating replication information for dissemination. To meet the needs of providing a model technology based project, Center staff must engage in information gathering beyond that required to address immediate service and facilities concerns.

The primary method of program development is the formal evaluation of Center activities under the Summative Evaluation Plan (Appendix D). Results of the initial summative evaluation are available in the 1986-87 final report and the results of the third year summative evaluation were reported in the previous section. The information gained on the effectiveness of Center activities provides feedback on where changes and additions to Center interventions may be necessary. The major development activity for the third year was the analysis of the evaluation results and identification of areas to be addressed based on these results. The results of the second year evaluation were used to refine assessment and intervention strategies. The results of the third year evaluation and the student satisfaction evaluation show that the Center is continuing to provide effective services that students believe are helpful. This information provides a solid empirical foundation for the procedures detailed in the Replication Manual.

The only specific development objective stated in the Center Evaluation Plan is Objective 3.7 concerning testing of prototype equipment. The purpose of this development activity goes beyond the identification of technology for establishing the Center. Prototype testing allows input from the Center into the development of new equipment through working relationships with industry and manufacturers of the technological equipment. Through these activities the needs of disabled persons can be expressed to manufacturers during the development of the products to help make these products more usable for the disabled.

During the third year the Center obtained a software grant of the LS-1 Authoring and Presentation System for the IBM InfoWindow system from IBM for the purpose of pilot testing an interactive videodisc reading comprehension support system. This project is also being funded by a grant from Cliff's Notes in Lincoln, NE. Development of the system is underway in conjunction with faculty from the Department of Educational Psychology and the Augmentative Communication Center at the Barkley Memorial Center with a pilot system being completed during the fall of 1988.

The Center staff have also received notice that they have been awarded an 18 month research and development grant from the U.S. Department of Education to develop and test an information accessing network system for providing adapted access to information data bases for disabled students with system testing conducted at the ECDS and in the local public schools. This project holds promise for significantly expanding the educational opportunities of disabled students.

The obtaining of funding to continue major research and development activities beyond the original grant period

indicates that Center staff have realized the objective of establishing the ECDS as a major facility for the development and testing of prototype applications for facilitating the educational opportunities of disabled students. These activities will continue and expand the original mission of the Center.

3. Client Satisfaction/Attitude Survey Results

Objective 1.7.3 of the Summative Evaluation Plan concerns evaluation of student attitudes concerning the Center and school work. During the first and second years the Intake Questionnaire and follow-up conducted by the Center's outside evaluation team headed by Dr. John Berman assessed student satisfaction with the Center. The first follow-up survey was completed in January, 1987 and the results were reported in the 1986-87 Final Report. During the third year Dr. Berman was on leave and unable to conduct further evaluations. As a result the Center staff conducted a follow-up survey of student users. The survey procedures and a summary of the results will be described in this section. The complete survey and detailed results are provided in Appendix F.

Procedures

The survey was conducted as a mail survey at the end of the second semester 1987-88 during May and June, 1988. Sixty-five surveys were sent to a stratified sample of the total student population using the Center. Thirty-two completed surveys were returned for a response rate of 49%. Surveys were kept anonymous with no student identifiers. The complete survey and cover letter are provided in Appendix F.

The demographic breakdown of respondents and self-reported use frequency are provided in following tables.

Student Demographics

	Number	Percent
Physical Disability	16	50
Visual Impairment	6	19
Hearing Impairment	3	9
Speech Impairment	1	3
Learning Disabled	6	19

Center Use

	Number	Percent
Daily	2	6
2-4 times per week	9	28
Once per week	6	19
Once every 2 weeks	5	16
Once per month	5	16
2-4 times per semester	3	9
Once per semester	2	6

Based on these demographics, we believe that the survey respondents adequately represent the total population of student users.

Results and Discussion

Students were asked to rate the Center services they used as either (a) very helpful, (b) somewhat helpful, or (c) not helpful. Services were grouped by (a) computer services, (b) academic services, and (c) traditional disabled student services. The most used computer services were word processing (62%), assistance with computer operation (56%), assistance with software operation (56%), spell checking (53%), and computer operation training (50%). All computer services were rated either somewhat or very helpful. For those computer services used by four or more students, ratings of services as very helpful ranged from 60-100%. The most used academic services were paper writing assistance (34%), help proofreading (34%), study assistance (28%), and tutoring (25%). Student ratings of academic services ranged from 14-73% (very helpful), from 18-57% (somewhat helpful), and from 9-29% (not helpful). The most used traditional services were registration assistance (88%), assistance with faculty (69%), financial aid assistance (47%), and alternative test taking (38%). Students rated all traditional services as either very or somewhat helpful with ratings of very helpful ranging from 55-100%.

The results of student satisfaction ratings indicate that students found Center services to be quite helpful, particularly the computer services and traditional services which were ranked as very helpful by a large majority of students. The rankings of academic services were lower than the other areas, though again the majority of students ranked services as helpful and no more than two students ranked any service as not helpful. Overall, these results indicated that students were satisfied with the quality and usefulness of the services provided by the ECDS. A complete breakdown of rankings is provided in Appendix F.

Students were asked to indicate whether they believed that ECDS services have helped them in school and whether using the computers helped them improve their writing. They were also asked to provide open-ended explanations of how the ECDS or computer usage helped them. Additional open-ended questions asked them to indicate what services they found most helpful, what they liked most and least about the ECDS, and what improvements they would like to see. Responses to the open-ended questions are provided in Appendix F. The answers to specific questions are summarized in the following table:

Question	Yes N	Yes %	No N	No %
Basic Services (N = 32)				
Have the services at the ECDS helped you do better in your school work?	25	78	7	22
Have the services at the ECDS helped you feel more confident about succeeding in school?	25	78	7	22
Have the services at the ECDS helped you be more productive and efficient in studying and completing assignments?	15	48	16	52
Computer Usage (N = 20, 12 students did not use)				
Has using a computer at the ECDS or your own computer to do writing helped you write better?	17	85	3	15
Has using a computer at the ECDS or your own computer to do writing helped you feel more confident about your writing ability?	15	75	5	25

Students overall indicated that they believed that ECDS services helped them do better in school and increased their confidence in their ability to succeed in school. Students who used computers for writing indicated that they felt that computer use increased their writing ability and confidence about writing. These results indicate that the ECDS has been successful in improving students' beliefs about their abilities to succeed in school and students' beliefs about their writing ability. The only area where students did not indicate substantial improvement was in studying where only 48% of respondents indicated that ECDS services helped them become more productive and efficient in studying. While this percentage is lower than the other rated areas, it indicates that almost half of the students using the ECDS believe that the services provided improved studying. This is hardly a trivial percentage, particularly given that the ECDS does not specifically teach a study skills course other than the cognitive skills class and only 7 of the 31 respondents indicated that they had attended this class.

Results of the student satisfaction and attitude survey indicate that students find ECDS services to be helpful and that they believe that ECDS services make a positive difference in their academic and writing performance and their confidence in their abilities to be successful in school. These results suggest that the Center has been successful in meeting its goal of improving students'

perceptions of their abilities to perform school related tasks and that the students are satisfied with the services being provided.

IV. DISSEMINATION ACTIVITIES

Goal 3 of the Evaluation Plan specifies that the Center will disseminate model project information to parents and students, the business community, and other post-secondary institutions. Specific objectives provide for compilation of information in a format suitable for dissemination and providing information to a variety of audiences (see Appendix A). This section of the report will detail third year dissemination activities. First and second year dissemination activities were reported in the 1985-86 and 1986-87 Final Reports.

A. Professional Reports and Presentations

Objective 3.3 specifies that Center staff will provide information to other education and service professionals through presentations, workshops and publication. The goal of these dissemination activities is to provide detailed information on Center activities and interventions for the purpose of furthering replication. Third year activities in this area have centered on presentation at relevant professional meetings and preparation of publication materials for professional journals with a focus on reaching new target audiences.

Third year presentations were completed or have been accepted for the following conferences:

1. Closing the Gap 5th Annual Conference on Microcomputer Technology for Special Education and Rehabilitation, Minneapolis, MN., October 22-24, 1987. This presentation titled "Adaptive and Compensatory Computer Technology for Disabled College Students: Applications and Evaluation Results" provided information on and demonstration of the Center's adaptive accessing technology and compensatory applications for completion of educational tasks. In addition, first year evaluation results were presented.

2. The 1988 Technology and Media Division, Counsel on Exceptional Children (TAM) Conference, Third National Conference: Integration of Technology in Schools, Homes, and Work Settings, Baltimore, MD., January 14-16, 1988. This presentation titled "Compensatory Technology for Mainstreaming" provided information on classroom related applications of technology for performing educational tasks related to information access, writing, and communication.

3. AHSSPPE (Association on Handicapped Student Service Programs in Post-Secondary Education) '88: AHSSPPE and All That Jazz, New Orleans, LA., July 20-23, 1988. Center staff presented at three sessions during the AHSSPPE conference. One session titled "Beyond Access: Classroom Applications of Compensatory Technology for Disabled Students" presented the ECDS interventions for augmentative speech and writing systems. The second session titled "Program Evaluation: Formative and Summative Methods" discussed the evaluation of the ECDS and provided a model for disability service program evaluation. The third session titled "How to Put a Camel Through the Eye of a Needle: Topical Session on Computer Access" was a topical question and answer session conducted in conjunction with persons from two other post-secondary programs providing computer services.

4. Closing the Gap 6th Annual Conference on Microcomputer Technology for Special Education and Rehabilitation, Minneapolis, MN., October 20-22, 1988. Center staff made two presentations. The first presentation, titled "What We Have Learned About Technology Usage for Disabled Students in Post-Secondary Education: Results of a Three-Year Demonstration Project", covered the Center's evaluation findings during the three years of the project and provided replication information. The second presentation, titled "Technologies for the Information Age: Enhancing Disabled Person's Access and Use of Text Based Information", covered new technology in networking and interactive videodisc and pilot research and development being done in the Center using these technologies.

5. International Association for Computing in Education, San Francisco, CA., March 27 - March 29, 1989. This presentation titled "Artificial Intelligence Systems for Disabled Students: Compensatory and Augmentative Technologies" will discuss integration of computer and human intelligence to enhance disabled student intelligent performance in educational settings with description of Center compensatory and adaptive technological interventions.

Five manuscripts have been published or accepted for publication during the third year:

1. "Effects of a Computer Based Educational Center on Disabled Students' Academic Performance", Journal of College Student Development, September, 1988.

2. "Beyond Access: Classroom Applications of Compensatory Technology for Disabled Students", Proceedings of the 1988 AHSSPPE Conference, in press.

3. "Program Evaluation: Formative and Summative Methods", Proceedings of the 1988 AHSSPPE Conference, in press.

4. "What We Have Learned About Technology Usage for Disabled Students in Post-Secondary Education: Results of a Three-Year Demonstration Project", Closing The Gap, in press.

5. "Technologies for the Information Age: Enhancing Disabled Person's Access and Use of Text Based Information", Closing The Gap, in press.

Two manuscripts were accepted by the ERIC resource center for inclusion in the ERIC data base. These were:

1. Computer Technology for Enhancing Disabled Student Writing: Applications and Limitations, based on the presentation at the CCCC conference

2. We Do - They Do: A Model For Practical Service Program Evaluation, based on the EVALUATION '86 conference presentation.

The following manuscripts are in preparation and will be submitted to the indicated journals as completed.

1. "Compensatory Technology Applications for Physically Disabled, Visually Impaired, and Speech Impaired Students", Journal of Special Education Technology.

2. "Scope: A Multiple Methods Framework for Internal Service Program Evaluation", Educational Evaluation and Policy Analysis.

3. "Providing Computer Based Services to Post-Secondary Disabled Students: Decision Processes, Technology Applications, and Student Utilization and Satisfaction", Journal of Postsecondary Education and Disability.

4. "Evaluating Post-Secondary Disability Service Programs", Journal of Postsecondary Education and Disability.

5. "Effects of a Computer Based Educational Center on Disabled Student's Academic Performance II: Results of an Outcome Evaluation and Student Survey", Journal of College Student Development.

Professional dissemination activities during all three years of the ECDS project have been successful in providing information about the Center and Center assessment and intervention techniques to a broad range of regional and national audiences. Evaluation feedback from conference presentations has been very positive and they have generated considerable interest in Center activities. The completion of third year dissemination manuscripts and the Replication Manual will provide a solid basis for the implementation of projects similar to the Center in other post-secondary institutions and will contribute significantly to the growing body of scientific literature in the field.

B. Outreach Activities to Schools, Parents, and Community

Outreach Activities as specified in Objective 3.4 involve providing information to parents, prospective students, regional school systems and community programs/agencies involved with disabled persons. These activities are focussed on increasing awareness of the Center and Center services among groups involved with educational and career planning for disabled students. The goals of these activities are to increase the awareness of disabled students and their parents of educational opportunities and to provide information for more effective educational and career decision making among those working with disabled students in educational and career decision making.

The primary vehicle for outreach activity was the Center newsletter Outreach. This quarterly newsletter was distributed to secondary school districts regionally, post-secondary institutions nationally, and regional service agencies, providing information on Center services and activities, technology for the disabled, information sources, and upcoming conferences. The newsletter has been effective in generating requests for additional information from a variety of schools and agencies (see Part E on information requests). As previously indicated Outreach has ceased publication and is being assumed by the newsletter of the AHSSPPE SIG on computers. A final Outreach was published during the third year (Appendix M).

Additional outreach activities have involved meeting with prospective students and their parents and conducting meetings and facility tours for groups representing regional schools and agencies. These activities have increased awareness of Center services and have resulted in increased requests for additional information and contacts concerning prospective student enrollment. As the grant period ends, plans are being made to establish an ongoing cooperative arrangement with State Vocational Rehabilitation and information on the Center has been made an integral aspect of new student enrollment and orientation activities at the University. These should insure that information about the

Center continues to be available to students, parents, regional school districts, and other disability service providers in the community.

C. Business Community Dissemination

Objective 3.5 specifies that the Center staff will provide information to the business community concerning technology and work site adaptations for disabled workers. The goal of these activities is to increase employment of disabled college students and to increase awareness in the employment community of relevant technology and adaptive equipment for facilitating disabled employees. The major activities in this dissemination area during the third year involved working cooperativly with major computer manufacturers in disseminating information to the business sector.

The Center staff have continued to work with the IBM Educational Systems Office in the sharing of information about available technology and in providing consultation on technological adaptations. The IBM Educational Systems Office refers many inquiries to Center staff and has provided a national base for disseminating information on adaptive technology to education, business and industry. This working relationship is expected to continue and expand.

Work with IBM has provided a valuable dissemination avenue. The Center is also pursuing cooperation with IBM in testing and evaluating new products and equipment. The Center has obtained on loan the LS-1 interactive videodisc program from IBM for the testing of videodisc applications. It is hoped that the relationship established to-date will continue to grow and expand. A working relationship with IBM holds the potential for both development of new technology and dissemination to a wide audience.

Dissemination activities with computer manufacturers and developers of specialized aids for the handicapped provide the computer industry with information of the needs of disabled students and help sensitize manufacturers to accessing and use issues. Hopefully, the continued providing of information to computer manufacturers will result in a greater awareness of disability issues in the design and production of new equipment and as well as encourage work in the development of disability aids and technology. Besides the direct information sharing with the computer manufacturers themselves, these contacts provide a broad dissemination network as information is passed to the users and customers of these manufacturers.

Continued business dissemination activities are planned for the year following the end of the grant period. A presentation at the Worknet Employment Committee Disability

Awareness Seminar was done during the fall, 1988 to provide information to local businesses on technological applications. As technological adaptations are developed, the ECDS will continue to pursue dissemination of work site modifications through presentations to business groups and publications.

D. Dissemination Methods and Materials

Objective 3.2 specifies that Center staff will compile relevant dissemination information and prepare dissemination materials. Materials are to be reviewed and updated semi-annually. This schedule coincides with the semi-annual evaluation and progress reports and insures that new data is incorporated into dissemination material as it becomes available. A diverse array of dissemination vehicles are used to accommodate the different audiences targeted by Center staff. Materials and methods for dissemination to each target audience will be summarized in this section.

The first dissemination audience is the OSERS funding agency. The primary dissemination material to OSERS during the third year is the year end final report. This report provides a detailed summary of Center activities and evaluation outcomes. The format of this report follows Transition Institute guidelines as set forth in the working paper "Developing the Final Evaluation Report". Additionally, the OSERS funding agency will receive a complete set of Replication Manuals when these are completed in the fall of 1988.

The second dissemination audience consists of other education and rehabilitation professionals working with disabled populations. Dissemination materials and methods for this audience primarily consist of presentations at professional conferences and meetings and publications in professional journals and other literature. These forums allow formal presentation of developed interventions, identified computer technology and its uses, evaluation methods, and evaluation results. An additional dissemination vehicle in this are will be the ECDS Replication Manuals. These dissemination materials add to the general body of scientific knowledge and practice in the fields of education and disability service and provide information for replication of Center activities.

Professional audiences also receive general information through the Center newsletter and brochure. In subsequent years these audiences will receive information through the Newsletter of the AHSSPPE Computer SIG. These sources provide awareness and descriptive information on Center activities and outcomes. This material fosters information requests and contact with other post-secondary institutions and service agencies. A final avenue of dissemination to

professionals involves responding to information requests and the distribution of developed replication materials and working papers. These dissemination materials provide information to other projects who wish to implement Center assessment, intervention or evaluation methods.

The third dissemination audience consists of prospective students, parents, and other school systems. The purpose of these dissemination materials is to increase awareness of the Center and its services among the current and prospective client population and those involved in educational/ vocational planning with students. The initial dissemination contact with these audiences is often the Center newsletter and brochure which provide general program information and contact information. Additional information is provided though phone and personal contact concerning services and entry to the University. During the third year, information on the ECDS was integrated into the new student admissions and orientation materials of the University to further provide information to students and parents on the availability of Center services.

The fourth dissemination audience consists of the business and employment community. The business community needs to be aware of the availability of computer technology that can allow disabled persons to be productive in the work place. Dissemination materials and methods for this audience include the IBM brochure and presentations for business groups. Disabled students continue to be placed as interns in the business community through the University Internship office.

The fifth dissemination audience includes the advisory committee and University administration. The primary dissemination material for this audience is a summary report prepared in conjunction with the final year-end reports to OSERS. This audience also receives the Center newsletter to update them on on-going activities.

The final dissemination audience consists of cooperating agencies and programs. These agencies receive various materials at their request, including evaluation reports, presentation papers, publications, working papers, equipment and curriculum evaluations and replication material. A final method of dissemination to this audience is individual consultations and meetings to share on-going activities, new product information, referrals, and general information.

Third year dissemination activities have continued the development and distribution of new materials. It is anticipated that the Center will continue to provide dissemination materials to all audiences in the years following the end of the Grant period.

E. Information Requests

Information requests have been primarily generated from the newsletter and conference presentations. These requests have asked for information about the original proposal, the needs assessment form, our cognitive skills strategies, technological interventions, and copies of various papers presented at conferences. Copies of available material and working papers have been sent in response to these requests.

In addition to providing information in this manner, a number of groups have requested the opportunity to visit the Center and be shown the various equipment and how it is utilized. During the third year visiting organizations have been the Lincoln Public Schools, State Vocational Rehabilitation, Worknet (a business executive group), Meyers Children's Hospital, Madonna Rehabilitation Center, and representatives of various Universities.

V. REPLICATION AND PROGRAM PRODUCTS

As a demonstration project, a primary goal of the Center is to develop materials and methods to allow replication of the program in other sites. A major focus of third year activities has been the development and production of materials for replication. Third year activities and products will be summarized in this section.

A. Replication Activities and Planning

Replication activities are conducted under Goal 2.0: Establish Educational Center for Disabled Students and Goal 3.0: Disseminate Model Project Information. While no specific program objectives directly address replication, the dissemination objectives of the Center, specified in Goal 3.0, are directed toward providing information obtained during the establishment of the Center in a form suitable for replication by others.

To foster replication, information must be disseminated in the following areas:

1. Selection of available technological equipment and software, program set-up, and program administration for establishing similar technology based programs.

2. Assessment of disabled student academic needs related to educational use of available technology.

3. Organization and use of identified equipment and software for addressing student academic needs.

4. Evaluation methods for assessing effectiveness and student progress.

Replication activities in these areas will be summarized in this section.

1. Technology and Software

Objectives 2.21 and 2.22 direct Center staff to conduct assessments of available technological hardware and program software to identify existing equipment and programs for meeting disabled student educational needs. Objective 3.7 specifies that staff will work to identify and test prototypes of equipment and software to determine the feasibility of utilizing this equipment to meet disabled student needs. These objectives are designed to keep Center staff up-to-date on current available technology and new developments in the field.

First year staff efforts were devoted primarily to assessing and procuring equipment and software to begin

Center operations, as detailed in the 1985-86 Final Report. Second year activities were detailed in the 1986-87 Final Report. During the third year, Center staff have continued to update information on equipment and programs, both general purpose and specifically designed to aid the disabled that could be utilized by others wishing to establish a similar program. This information has been added to the inventory and vendor list (Appendix L). In addition, a bibliography of sources has been prepared indicating where information can be obtained on technology and software (Appendix K). All of these are currently available on request and will be included in the ECDS Replication Manual. Information on the equipment and software utilized in the ECDS and decision making in the selection of equipment and software was included in presentations to the Technology and Media Division of the Council on Exceptional Children, the Association of Handicapped Student Service Programs in Post Secondary Education (AHSSPPE), and Closing The Gap and is included in articles to be published in the AHSSPPE Conference Proceedings and Closing The Gap.

Current activities in prototype testing involve work on an interactive videodisc program for reading comprehension support for learning disabled students and continued testing of the portable speech communication system/workstation based on the Toshiba Portable Computer. Additionally, the ECDS has obtained a grant from the U.S. Department of Education to test an information accessing system using networking, CD-Rom data bases, and optical scanning. On-going testing projects involve the use of portable computers for in-class notetaking and writing, development of the cognitive study skills program, and continued examination of keyboard alteration/ abbreviation entry software. Details of these on-going projects were provided in the 1985-86 and 1986-87 Final Reports. The technical reports and assessments of these products will be produced and made available when testing is completed.

2. Academic and Technological Assessment

The use of computers, other technology, and software in an educational setting requires assessment methods that can address both educational needs and ability to access technology. Center Objective 1.1 specifies that each student's needs will be assessed for the purpose of developing an Individual Educational Plan for the student. Objectives 2.11 and 2.12 specify that a general assessment of population needs will be completed. These assessment needs differ from more traditional assessment issues involving determination of existence and level of disability. Key assessment issues for a program such as the Educational Center are (1) what educational difficulties result from disability and (2) what adaptive needs do disabled students have for accessing technological equipment and programs.

The assessment approach used in the Center was detailed in the 1985-86 and 1986-87 Final Reports. During the third year an assessment procedure for learning disability was developed in conjunction with a local clinical psychologist and was implemented to supplement existing assessments. The ECDS assessment procedures will be made available in the ECDS Replication Manual. Also, information concerning assessment was included in presentations made the Association of Handicapped Student Service Programs in Post Secondary Education (AHSSPPE), and Closing The Gap conferences and is included in articles to be published in the AHSSPPE Conference Proceedings and Closing The Gap.

3. Organization and Use of Technology

A major first year finding, as detailed in the 1985-86 Final Report, was that to be effective, technology must be organized into a treatment package and integrated with other educational and skills training. For replication of the Center, information on how to most effectively use technology must be included in addition to simply listing sources of technological interventions and assessment instruments.

The organization and use of technology is summarized in the Center intervention strategies detailed in the 1985-86 and 1986-87 Final Reports. The particular strategies developed to-date are designed to facilitate the disabled student's educational opportunity. When combined with assessment under the IPO Model, these strategies allow the technology to become a treatment tool that can be directed at specific student needs in the educational environment. It is this combination of assessment and intervention that makes the Center more than just a computer room. Full replication requires that programs wishing to duplicate the Center also provide more than a computer room.

The primary third-year activities in this area have been the development of an intervention manual with how-to instructions on utilizing the intervention strategies developed in the Center as part of the ECDS Replication Manual. Conference presentations at the Technology and Media Division of the Council on Exceptional Children, the Association of Handicapped Student Service Programs in Post Secondary Education (AHSSPPE), and Closing The Gap have provided information on intervention strategies and intervention strategies and their use are included in articles to be published in the AHSSPPE Conference Proceedings and Closing The Gap. The Replication Manual and these other dissemination activities will allow other post-secondary institutions to implement the same type of technological interventions as the ECDS.

4. Evaluation Methods

As with any treatment program, it is critical that evaluation be made of impact and effectiveness. With a technology based program it is also necessary to test equipment and uses of the equipment to determine effective interventions and usability. Since the computer technology field is constantly changing with new equipment and software, replication of the Center requires consistent ongoing evaluation to identify new technology and new uses of the technology. In many respects a technology based program such as the Center is constantly in development due to the ever changing nature of the technology field. This means that evaluation strategies must be geared toward formative, process based evaluation as well as the more traditional outcome assessment.

The Center Evaluation Plan (Appendix A) provides a guide to evaluation activities for programs wishing to replicate. This plan is geared toward providing information for the operation of the program and is seen as an integral part of the operation of the Center. Third year replication activities in this area have involved completion of the ECDS Replication Manual and dissemination of evaluation methods and results. The paper "We Do -They Do: A Model for Practical Service Program Evaluation" was entered into the ERIC data base, a presentation on Center evaluation methods was presented at the 1988 AHSSPPE Conference, and a article based on the AHSSPPE presentation will be published in the AHSSPPE Conference Proceedings. Also, a report of the findings of the first Center evaluation was published in the September, 1988 volume of the Journal of College Student Development. These materials provide information on how to organize and conduct evaluation of a program like the Center that can be utilized by those wishing to replicate the Center.

B. Products and Product Development

Program products include replication materials, formal reports and papers, and informal reports, working papers, and technical reports. This section will detail products completed during the three years of the ECDS project and current products in preparation.

1. Replication Materials

Development of formal replication materials is in progress. The primary replication product is the ECDS Replication Manual to be completed by the fall of 1988. The Manual is as follows:

1. An administrative guide discussing decision processes in establishing and operating a computer based educational center including information on equipment and software, staffing, and budgeting with

an equipment and software resource book specifically addressing the college and business environment.

2. An assessment manual detailing assessment processes for determining technological and academic support intervention needs of students and determining needed adaptive accommodations.

3. An intervention manual describing developed technological interventions.

4. An evaluation packet providing guidelines for conducting program evaluation including evaluation planning, data collection, data analysis, and utilization of evaluation findings..

2. Formal Reports and Papers

Formal reports and papers are products that contribute to the general body of scientific knowledge and practice in the disability services and educational fields. These products are primarily in the form of published articles in the professional literature. Published articles to-date are:

1. Horn, C., Shell, D. F., & Severs, M. (1985). Microcomputers and the Disabled College Student. In Proceedings of the MRADE/WCRLA conference. Available from Western College and Learning Association, Kearney State College, Kearney, NE.

2. Horn, C., Shell, D. F., & Severs, M. (1986). Survival skills for disabled college students: Computer technology and cognitive skills training. In Proceedings: The ninth national conference of the Association on Handicapped Student Service Programs in Post-Secondary Education, AHSSPPE '86. Available from AHSSPPE, Columbus, OH.

3. Horn, C., Shell, D. F., & Severs, M. (1987). The educational center for disabled students: An integrated technology and cognitive skills program for disabled college students. 1986 Closing the Gap Conference Proceedings. Available from Closing the Gap, Henderson, MN.

4. Severs, M. (1987). Computer technology for enhancing disabled student writing: Applications and limitations. Lincoln, NE: University of Nebraska-Lincoln, Educational Center for Disabled Students. (ERIC Document Reproduction Service No. ED 200 526)

5. Shell, D. F., Horn, C. A., & Severs, M. K. (1988). We do - they do: A model for practical service program evaluation. Lincoln, NE: University of Nebraska-Lincoln, Educational Center for Disabled Students. (ERIC Document Reproduction Service No. ED 287 833)

6. Shell, D. F., Horn, C. A., & Severs, M. K. (1988). Effects of a computer based educational center on disabled students' academic performance. Journal of College Student Development, 29, 432-440.

7. Horn, C. A., Shell, D. F., & Severs, M. K. (in press). Beyond access: Classroom applications of compensatory technology. In Proceedings of the 1988 AHSSPPE Conference.

8. Shell, D. F., Horn, C. A., Benkofske, M. T. H., & Severs, M. K. (in press). Program evaluation: Formative and summative methods. In Proceedings of the 1988 AHSSPPE Conference.

9. Horn, C. A., Shell, D. F., & Benkofske, M. T. H. (in Press). What we have learned about technology usage for disabled students in post-secondary education: Results of a three-year demonstration project. Closing The Gap.

10. Shell, D. F., Horn, C. A., & Bruning, R. (in Press). Technologies for the information age: enhancing disabled person's access and use of text based information. Closing The Gap.

As indicated in Section IV, further papers are in progress for dissemination. These are expected to increase the number of formal papers produced by the ECDS project during the next year.

3. Informal Reports, Working Papers and Technical Reports

Informal reports, papers and technical reports are the methods for reporting ongoing project developments and findings. This class of product includes papers presented at professional conferences, mid-year and final evaluation reports, drafts of papers in progress, and program instruments. These type of materials represent the initial work leading to replication materials or formal papers.

Informal reports and working papers currently available on request are:

1. Shell, D. F., Horn, C., & Severs, M. (1986). We do-they do: A model for practical service program evaluation. Paper presented at EVALUATION '86, Kansas City, MO.

2. Severs, M. (1987). Computer technology for enhancing disabled student writing: Applications and Limitations. Paper presented at Conference on College Composition and Communication, Atlanta, GA.

3. Horn, C. A., Shell, D. F., & Severs, M. K. (1988). Beyond access: Classroom applications of compensatory technology. Paper presented at the 1988 AHSSPPE Conference.

4. Shell, D. F., Horn, C. A., Benkofske, M. T. H., & Severs, M. K. (1988). Program evaluation: Formative and summative methods. Paper presented at the 1988 AHSSPPE Conference.

5. Horn, C. A., Shell, D. F., & Benkofske, M. T. H. (1988). What we have learned about technology usage for disabled students in post-secondary education: Results of a three-year demonstration project. Paper presented at the 1988 Closing The Gap conference.

6. Shell, D. F., Horn, C. A., & Bruning, R. (1988). Technologies for the information age: enhancing disabled person's access and use of text based information. Paper presented at the 1988 Closing The Gap conference.

7. 1985-86 Mid-Year Evaluation Report.

8. 1985-86 Final Report.

9. 1986-87 Mid-Year Evaluation Report.

10. 1986-87 Final Report.

11. 1987-88 Final Report.

VI. SUMMARY AND CONCLUSIONS

Summary

This report has detailed third year activities and evaluation results for the Educational Center for Disabled Students at the University of Nebraska-Lincoln. Third year activities have focused on continued evaluation of the Center in accordance with the Center Evaluation Plan, increased dissemination activities, and development of replication materials.

Major third year activities, summarized by program goal, were:

A. Goal 1: Improve Student Academic Performance and Attitudes Toward School.

1. Development of a formal assessment methodology based on the Center's IPO Model for assessing the educational and technological needs of disabled students.

2. Component evaluation of Center technological, skill training and adaptive interventions to further define intervention methodology.

B. Goal 2: Establish Educational Center for Disabled Students.

1. Development of resource materials for technology, software and vendors concerning available materials for post-secondary applications.

2. Expanded program evaluation focussing on more detailed information gathering through expanded student logs and staff logs.

C. Goal 3: Disseminate Model Project Information.

1. Targeting of presentations to yet-to-be reached audiences.

2. Focussing presentations and papers on replication oriented materials.

3. Development of formal papers covering Center assessment techniques, intervention methodology, and evaluation results.

4. Increasing business community dissemination activities to provide information on technology and aid in student transition to the workplace.

5. Development of a replication booklet containing technology resources, an assessment manual, an intervention manual, and evaluation materials.

Completion of these activities has allowed the Center to meet the goals and objectives set forth in the evaluation plan for third year activities.

Major findings of the second summative evaluation are as follows:

1. Increases in GPA identified in the first evaluation have maintained during the third year and new third year students have attained GPA's equivalent to previous student populations.

2. Incidents of academic suspension or probation for new third year students were lower than students not receiving Center services and equivalent to second year students. Suspension and probation for all disabled students remains equivalent to the general student population at the University.

3. A higher percentage of third year students are completing 100% of attempted credit hours than did students prior to the start of the Center.

These results indicate that the Center is having a positive effect on the students utilizing its services.

Major third year dissemination activities included seven professional conference presentations, five professional publications, and two documents accepted into the ERIC data base. These activities along with the final publication of the Center Newsletter Outreach and the establishment of the AHSSPPE Computer SIG Newsletter have allowed other professionals, students, parents, and academic institutions to receive valuable information about technology and the uses of technology identified through Center activities.

During the third year the Center has been successful in meeting its goals and objectives. Third year activities have resulted in further formalization of the operational methods of the Center for student needs assessment and treatment intervention using technology and educational skills. Evaluation results demonstrate that established interventions are effective. Dissemination activities have continued and broadened to include new audiences and have lead to the in-progress creation of Replication Manuals. These third year accomplishments have resulted in a successful conclusion to the ECDS project and realization of the original project goals.

Conclusions

Conclusions from third year activities and evaluation results support and expand first and second year conclusions. First, a technological based educational Center can be effectively developed and operated over time. Center staff have identified equipment, software, and other skill training materials that can be used to assist disabled college students in the pursuit of their educational objectives. Formalization of Center interventions throughout the second and third years has established the base for the ECDS Replication Manuals for replication of these interventions by other post-secondary institutions.

The second conclusion, derived from evaluation results, is that the establishment of a technological center can have a significant positive effect on the academic performance of disabled students. Improvements identified in GPA and credit hours passed, and the decrease in students with academic problems, indicate that the Center contributes to the success of disabled students in the academic setting. This information is important proof of the viability and effectiveness of a technology based program.

The final conclusion reach by Center staff is that implementation of technology based services must be closely tied to specific evaluation processes and objectives. It is imperative that both process and outcome data be gathered if technology is to be effective in enhancing the educational opportunities of disabled students. Sharing of information and replication must be done by programs working in this area if an effective technology based service is to be provided. Information on the definition of what services are provided, identification of how technology should be used and identification of other training that must be implemented to augment the technology can only be obtained from good evaluation methodology and practice so that results of these activities can be known and replicated. As a result of this conclusion, the ECDS Replication Manuals contain an extensive evaluation section and ECDS staff have initiated presentations and publications concerning evaluation methods and materials.

VII. FINAL PROJECT SUMMARY REPORT

A. Goals and Objectives

The Educational Center for Disabled Students was established at the University of Nebraska-Lincoln in August, 1985 to provide services to students with a broad range of both physical and learning disabilities. The goals of the Center were to:

1. Improve student academic performance and attitudes toward success in college through the use of computer technology and academic skills training.

2. Establish the Educational Center for Disabled Students utilizing appropriate computer equipment and software.

3. Disseminate model project information concerning computer technology and academic training to prospective students, parents, the business community and other postsecondary institutions.

In this section, we will provide a summary of the three years of the ECDS project in relation to these goals. We will examine the accomplishments of the project during the three year grant period and draw conclusions concerning the effectiveness of the ECDS project in meeting its three primary goals.

B. Accomplishments/Milestones

Program goals and objectives are detailed in the Center Evaluation Plan (Appendix A). Accomplishments for the objectives related to each program goal will be detailed in this section. A summary of accomplishments by objective is provided in the Evaluation Plan Final Summary Report (Appendix C).

Goal 1: Improve Student Academic Performance

Objectives for Goal 1 focus on assessment of student needs, delivery of services and evaluation of student progress. Major accomplishments during the three year grant period for Goal 1 were:

1. Development of the IPO Assessment and Intervention Model (Year 1).
2. Creation of assessment instruments and methods for implementing IPO Assessment (Years 1 & 2).
3. Development of IPO based learning disability assessment (Year 3).
4. Development of ECDS Technological and Skill Training Interventions (Years 1 & 2)

5. Establishment of the effectiveness of Technological and Skill Training interventions and other ECDS services through findings of improvement in academic performance and improvement in student perceptions of skills (Years 2 & 3).
6. Completion of Replication Manuals for the assessment process (Year 3).
7. Completion of Replication Manuals for Technological and Skill Training Interventions (Year 3).

These highlights will be detailed by a synopsis of the project accomplishments for each Evaluation Plan Objective.

Objective 1.1 was to evaluate student technology and skill training needs. The necessary evaluation processes for technology and skill training needs had not been identified in the literature at the start of the Center; thus, the staff of the ECDS had to develop an evaluation procedure relevant to determining the technology and skill training needs of the student population served. Through the process of establishing a student assessment methodology and conducting student assessments, the Center has been able to determine the assessment needs relative to the provision of services in the post-secondary environment and how these differ from other assessment contexts (e.g., rehabilitation). The information gained is reflected in the IPO Assessment process and will be available through the ECDS Replication Manual to other post-secondary institutions.

Objectives 1.2 and 1.3 were to provide training in technology and skill training areas based on student assessments. The ECDS staff developed the IPO Technology and Skill Training interventions (Appendix I) as a framework for providing training and meeting student needs. These interventions provide strategies for the utilization of technology that go beyond basic equipment access by addressing educational needs. Because there is little literature on the systematic utilization of technology to facilitate educational achievement, the Center intervention strategies fulfill a vital need. These strategies are available through publications and the ECDS Replication Manual. Additionally, the ECDS staff has extensively examined student use patterns, student satisfaction with training, and staff training activity. Data from these evaluations indicates that training is critical for the application of technology in the post-secondary setting and that on-going staff support is required for effective implementation of technology.

Objective 1.4 was to evaluate student progress in the use of technology and skill training interventions. Through examination of student use patterns, student satisfaction, and staff activity patters, staff has determined that students can learn to effectively utilize technological

applications to perform class related work and can effectively make use of cognitive skills training to improve study skills. The findings on student progress indicate that technology use in post-secondary disability service programs must be implemented within a broader support and service context and that the creation of an accessible computer room will not be sufficient for the adequate provision of services.

Objectives 1.5 was to evaluate the educational progress of students utilizing ECDS services. Results from evaluations conducted in the second and third year indicate that students utilizing Center services (a) have high semester and cumulative GPA's, (b) fewer instances of suspension and probation, and (c) a higher frequency of passing 100% of attempted credits than students not utilizing Center services. During the time of ECDS operation the drop-out and suspension/probation rates of students using the Center have become equivalent to the drop-out and suspension/ probation rates of the general student population. These findings indicate that the ECDS project was successful in achieving the goal of improving academic performance.

Objective 1.6 was to evaluate the progress in student writing. This objective was dropped in Year 2 due to complications in the sample populations. However, student self-reports on the ECDS follow-up survey indicate that a majority of students believe that technology use has improved their writing skills and their confidence in their writing.

Objective 1.7 was to evaluate student attitudes and perceptions about school. Data from outside evaluations and from the ECDS follow-up evaluation indicated that students had more positive attitudes toward school, more confidence in their abilities to do school related tasks, and were more likely to ascribe the causes of school success to their own abilities and effort following the use of Center services. Thus, the ECDS was successful in increasing positive student attitudes.

Goal 2: Establish Educational Center for Disabled Students

Objectives for Goal 2 focus on the establishment of the physical facilities through the determination of student needs and the obtaining of hardware, software, and support materials to meet those needs, on the creation of cooperative agreements for supplemental services, on obtaining funding for Center continuation and expansion, and on evaluation of the Center. Major accomplishments during the three year grant period for Goal 2 were:

1. Establishment of the Center with operational adapted computer systems to serve physically, visually, speech, and learning disabled students (Years 1&2).

2. Identification of decision processes in the obtaining of equipment and software and constraints on the delivery of services (Years 1, 2 & 3).
3. Identification of appropriate technology and curriculum materials for post-secondary applications (Years 1, 2, & 3)
4. Creation of cooperative agreements with the Barkley Memorial Center and State Vocational Rehabilitation for auxiliary services (Years 1, 2, & 3).
5. Obtaining additional funding and equipment/software grants from university and business sources (Years 1, 2, & 3).
6. Completion of extensive evaluations of Center effectiveness, student/staff activity patterns, and student attitudes (Years 2 & 3).
7. Completion of Replication Manuals for Implementation and administration of an ECDS Center (Year 3).

These highlights will be detailed by a synopsis of the project accomplishments for each Evaluation Plan Objective.

Objectives 2.11 and 2.12 were to identify the population needs related to the student population served. During each of the three years of ECDS operation, population profiles were developed identifying disability related and educational needs of students. The major finding from these population needs assessments was that technological and academic needs are best defined from a functional, cognitive perspective as reflected in the Center's IPO model; rather, than from a medical or clinical perspective. Relevant technological and academic interventions most effectively meet student needs when they are organized in relation to information processing tasks and classroom activities rather than in relation to the disability classification of the student. Discussion of this needs assessment approach and the organization of interventions is provided in the ECDS Replication Manual.

Objectives 2.21 and 2.22 concern identification of available equipment and software for establishing the physical aspects of the Center. As detailed in the 1985-86 Final Report, little educational or specific technology for the disabled was found to be appropriate for post-secondary student needs. Center staff determined that basic business software and computers with minimal specific disability related adaptation were the most effective for meeting information processing needs and the most liked by disabled students. It was also determined that effective systems could be created that could be directly used by most disabled students without special adaptive modification. The decision processes in assessing equipment and software developed in the ECDS are provided in the Replication Manual.

Objectives 2.31 and 2.32 concern obtaining equipment and software to meet identified needs. Primary acquisition

activities for establishment of the ECDS physical facilities were done during the first year and are reported in the 1985-86 Final Report. During the second and third years the effectiveness of this equipment and software was assessed by examining student use patterns and student satisfaction. The major findings from the establishment of the Center and the three years of operation were that (a) a technology based student service facility can be developed and implemented to provide compensatory technology interventions in addition to basic computer accessibility that can effectively meet the educational needs of disabled students, (b) students will utilize such a facility if it is made available, and (c) use of a compensatory technology facility can improve student performance and attitudes. Specific equipment and software and the compensatory technology interventions within the IPO model are provided in the Replication Manual.

Objectives 2.41 and 2.42 concern identification of other available services and arrangement of working/cooperating agreements. During the course of Center operation, it became apparent that technology services can not be provided in isolation from other types of academic and disabled student services. Thus, to be effective, technology based services must be implemented in conjunction with other services. This requires providers of technology services to disabled students to integrate and coordinate with other institution and local agencies and programs to provide a comprehensive service to students. During the three years of operation, the ECDS was able to effectively coordinate with campus, state, and local service providers and has become a major coordinating agency and information resource for students, parents, and service providers.

Objectives 2.51 and 2.52 are related to evaluation activities. As a demonstration project, a major activity during the three years of Center operation was the evaluation of Center operation and effectiveness. During the first year, a formative and summative evaluation plan was created to direct Center evaluation activities. Extensive evaluations of the Center were conducted during the second and third year that have provided valuable replication information. An important result of Center evaluation activities has been the dissemination of basic evaluation process information through presentations and publications. This information will aid other disabled student services providers in organizing and conducting evaluations of their programs. The evaluation framework and procedures used by the Center are included in the Replication Manual.

Objective 2.6 concerns additional funding and expansion of the Center. Because of the changing nature of technology, computer based service programs must obtain and test new developments in the field. This requires funding beyond that necessary to provide base service to students. During the

three years of Center operation, the staff have actively pursued external funding to obtain new equipment and software and to conduct further research. This has resulted in grants for equipment from the University of Nebraska Foundation and Digital Equipment Corporation and research grants from IBM, Cliff's Notes, and the U.S. Department of Education. A recently received major research grant from the U.S. Department of Education to develop and test information delivery networks will allow the Center to expand its compensatory technology interventions to include support of information obtaining. The Center has established itself a major research and development facility in the field of compensatory educational technology and staff will continue to pursue funding to support improvement and expansion of the technology based services for disabled students developed during the ECDS demonstration project.

Goal 3: Disseminate Model Project Information

Objectives for Goal 3 concern dissemination activities for information sharing and replication. Major accomplishments during the three year grant period for Goal 2 were:

1. Publication of the Center Newsletter Outreach (Years 1, 2, & 3) and establishment of the AHSSPPE Computer Sig Newsletter (Year 3).
2. Completion of 16 presentations at national or regional professional conferences and 10 professional publications (Years 1, 2, & 3).
3. Development of a program brochure (Year 1) and integration of Center information into University applications and reference materials for students and parents (Year 3).
4. Completion of an Application Brief by IBM Corporation describing Center computer applications (Year 2).
5. Development of a Replication Manual (Year 3).
6. Development and testing of prototype laptop systems, optical scanning, and interactive videodisc (Years 1, 2, & 3)

These highlights will be detailed by a synopsis of the project accomplishments for each Evaluation Plan Objective.

Objective 3.1 relates to publication of the Center Newsletter Outreach. During the first two years of Center operation, Outreach was published quarterly by ECDS staff. During the third year, Christy Horn, Center Coordinator, assumed chairmanship of the Association on Handicapped Student Service Programs in Post-secondary Education (AHSSPPE) Special Interest Group for computers and Outreach was replaced by the SIG newsletter. Establishing the AHSSPPE SIG Newsletter insures that the information provided by

Outreach will continue to be provided now that the three year grant period has ended.

Objective 3.2 concerns compilation of dissemination information and development of dissemination materials. During the course of the three year grant period, Center staff have developed varied dissemination material for all target dissemination groups. The information compiled concerning equipment and software, interventions, effectiveness, use patterns, and student satisfaction have provided a data base for the preparation of professional dissemination presentations and publications, the creation of brochures and information for parents and students, and the development of brochures and information for the business community. The extensive data base that has been developed provides an information resource that will be the foundation for future Center activities and for other programs wishing to develop computer based services.

Objective 3.3 concerns providing information to other professionals in education and rehabilitation for the purposes of replication and expanding the general knowledge base in the field. During the three year grant period, Center staff made 12 national and four regional conference presentations. Presentations were made at major conferences for post-secondary service providers and for professionals in the area of disability technology, including presentations at Closing the Gap, the Technology and Media Division of the Council on Exceptional Children, and the Association on Handicapped Student Service Programs in Post-Secondary Educations (AHSSPPE). Ten publications have been completed by Center staff in Journals and conference proceedings. These presentations and publications have fulfilled the Center goals of providing replication and professional/ scientific knowledge to other professionals in the field. It is anticipated that the Center will continue to be a major information source in the years following the end of the grant period.

Objective 3.4 relates to information sharing with students, parents, school systems, and the community. During the course of the three year grant period, numerous information sharing activities have been initiated to disseminate information to students, parents, schools and the community, including articles in the University Student Newspaper, completion of a program information brochure, and integration of Center services into University Application and information materials. A significant aspect of this dissemination area has been personal contact with perspective students and their parents either through telephone conversations or visits by students and parents to the Center. The Center is now also listed in various national guides to post-secondary services for disabled students. That the Center staff have been effective in meeting this

dissemination goal is provided by the increased regional and national contact from students expressing an interest in attending the University because of Center services.

Objective 3.5 concerns dissemination to the business/ employment community. Of the three dissemination target areas, staff have been least active in business community dissemination. Highlights of this area have been the completion of a brochure on the Center by IBM Corporation that has been widely distributed to businesses and academic institutions by IBM, establishment of the ECDS as an information source for the IBM Hotline for the Handicapped, and work with major hardware and software manufacturers on improving access to computer products for disabled persons. Staff have begun presenting information on worksite accommodations to the local business community and anticipate an increase in business contact and dissemination in future years as more students enter the marketplace. While the dissemination in this area has been limited, staff believe that the dissemination efforts done have been successful.

Objective 3.6 deals with the providing of educational/ training opportunities to students in disability related fields though internships. Over the course of the three year grant period seven students interned in the ECDS from the departments of Human Development and the Family, Computer Science, Special Education, and School Psychology. These internships have allowed students to gain hands-on experience working with the Center technology and skill training interventions. During the grant period, seven disabled students were placed, in cooperation with the University Internship Office, in internships in the business community. These placements have helped disabled students gain job related skills and helped to educate the business community concerning the abilities of disabled workers. The Center staff believe that the project has been highly successful in realizing this objective. As the Federal funding for the Center ceases, it is anticipated that interns will play an increasing role in aiding staff in providing service to the disabled student population of the university.

Objective 3.7 concerns development and testing of new advances in technology. During the three year grant period, Center staff have obtained an tested a variety of equipment and software, including portable computers, Morse Code input, word prediction software, optical scanning, and interactive videodisc. Communication with equipment and software manufacturers has resulted in improvements in programs and equipment. Center staff have received a grant for the development of an information access network system for physically disabled, visually impaired, and learning disabled students. This project will continue to allow Center staff to develop and test new prototypes of technology for disabled students. While this research and development area was not

the primary objective of Center activities, staff believe that this objective has been achieved and that the Center has established itself as a leader in the research and development of disability technology and its application.

C. Summary and Conclusions

At the inception of the ECDS, as detailed in the 1985-86 Final Report, there was virtually no information on the application of technology in a post-secondary service setting or the effectiveness of technology in aiding disabled students in the educational environment. The information that did exist consisted primarily of accessing methods to allow alternate operation of computer equipment and programs by disabled persons. During the three years of Center operation, staff have determined that:

a) technology can be effectively integrated into an ongoing disability service program.

b) technological applications can be developed to meet specific educational needs of disabled students.

c) disabled students using technology applications exhibit significantly improved academic performance and improved attitudes about their own abilities.

d) disabled students will utilize technology when it is made available.

Based on these findings, the conclusion of Center staff is that technology based services, provided in an environment similar to the ECDS, can be implemented in post-secondary settings and will, if implemented, contribute positively to disabled students' academic achievement.

The technology applications developed in the Center provide a technology service model that can be used by other post-secondary institutions to develop technology based service programs. Thus, we believe that the ECDS project has been successful as a demonstration project.

Educational Center for Disabled Students Evaluation Plan
Formative Evaluation

Program Goals and Objectives	Evaluation Objectives
1.0 Goal: Improve Student Academic Performance and Attitudes.	
1.1 Evaluate student needs for adaptive hardware/software and skill training in academic areas.	Evaluation completed for each student.
1.2 Provide training in adaptive hardware/software for areas identified in evaluation.	Adaptive hardware/software training completed on schedule.
1.3 Provide training in academic skill areas identified in evaluation.	Academic skill training completed on schedule.
1.4 Evaluate student progress in use of adaptive hardware/ software and development of academic skills.	Progress evaluations completed on schedule.
1.5 Evaluate educational progress of students in the program.	Summative evaluation of academic progress completed on schedule.
1.6 Evaluate progress in student writing resulting from use of adaptive hardware/ software.	Evaluation area dropped as per 1986-87 final report.
1.7 Evaluate student attitudes toward school and perceptions of ability to perform school related tasks.	Summative evaluation of attitudes and perceptions completed on schedule.

Program Goals and Objectives	Evaluation Objectives
2.0 Goal: Establish Educational Center for Disabled Students.	
2.11 Conduct adaptive hardware/ software needs assessment for student population in program.	Adaptive hardware/software needs assessment completed each semester.
2.12 Conduct educational needs assessment for student population in program.	Educational needs assessment completed each semester.
2.21 Conduct assessment of available adaptive hardware and software for meeting needs identified in needs assessment.	Adaptive hardware/software availability assessment completed each semester.
2.22 Conduct assessment of available educational software for meeting needs identified in needs assessment.	Educational software availability assessment completed each semester.
2.31 Obtain adaptive hardware and software to meet identified needs.	Complete acquisition of hardware and software each semester.
2.32 Obtain educational software to meet identified needs.	Complete acquisition of educational software each semester.
2.41 Conduct survey of adjunctive services available at the University of Nebraska and in the community.	Adjunctive services survey completed annually.
2.42 Arrange cooperative agreements between center and identified adjunctive service organizations.	Cooperative agreements completed annually.
2.51 Develop evaluation plan for center activities.	Evaluation plan completed and updated annually.
2.52 Evaluate center and center activities.	Evaluation completed in accordance with annual evaluation plan.
2.6 Obtain additional funding for the center.	Additional funding sources obtained.

Program Goals and Objectives		Evaluation Objectives
3.0	Goal: Disseminate Model Project Information.	
3.1	Publish newsletter on center activities.	Evaluation area dropped as per 1986-87 Final Report.
3.2	Compile dissemination materials on center and center activities for publication and presentation.	Dissemination materials completed semi-annually.
3.3	Provide information on adaptive hardware/software and training to education and service professionals.	Complete workshops, training sessions, and publications for service and education personnel.
3.4	Provide information about the center to prospective students and parents.	Complete publications and presentations for prospective students and their parents.
3.5	Educate the business community concerning adaptive hardware/software for the workplace.	Complete publications and presentations for business organizations.
3.6	Provide internship opportunities at the center for students interested in disability and rehabilitation issues.	Complete placement of interns with the center.
3.7	Conduct testing of prototype adaptive hardware/software.	Prototype hardware/ software obtained and tested.

Evaluation Plan
Third Year Summary Report

1.0 Goal: Improve Student Academic Performance and Attitudes.

	Program Objective	Status	Product or Comment
1.1	Evaluate student needs for adaptive hardware/software training in academic areas.	2	Partial evaluations obtained for all students. Replication assessment instruments in progress.
1.2	Provide training in adaptive hardware/software for areas identified in evaluation.	2	Formal classes not implemented. Replication materials in progress.
1.3	Provide training in academic skill areas identified in evaluation.	1	Individual skill training instruction provided. Cognitive skills class initiated. Replication materials in progress.
1.4	Evaluate student progress in use of adaptive hardware/software and development of academic skills.	1	Use logs for time on equipment and software implemented. Third year evaluation completed.
1.5	Evaluate educational progress of students in the program.	1	Third year evaluation completed July, 1988. Report Available.
1.6	Evaluate progress in student writing resulting from use of adaptive hardware/software.	3	Activity suspended in 1986-87.
1.7	Evaluate student attitudes toward school and perceptions of ability to perform school related tasks.	2	Outside evaluation discontinued. ECDS follow-up student survey completed July, 1988. Report available.

Status Codes

1 = Completed satisfactorily as planned
2 = Completed satisfactorily - deviated from plan
3 = Activity abandoned
4 = Not completed satisfactorily

2.0 Goal: Establish Educational Center for Disabled Students.

	Program Objective	Status	Product or Comment
2.11	Conduct adaptive hardware/ software needs assessment for student population in program.	1	Population demographics and needs summary completed.
2.12	Conduct educational needs assessment for student population in program.	1	Educational needs summary completed.
2.21	Conduct assessment of available adaptive hardware and software for meeting needs identified in needs assessment.	1	Assessment completed. Source Bibliography and vendor list available.
2.22	Conduct assessment of available educational software for meeting needs identified in needs assessment.	1	Assessment completed. Source Bibliography and vendor list available.
2.31	Obtain adaptive hardware and software to meet identified needs.	1	IBM System 2 Model 60 and two Toshiba T1000 Plus computers obtained. Inventory updated and available.
2.32	Obtain educational software to meet identified needs.	1	No new software or materials aquired. Cognitive skills materials being tested. Inventory available.
2.41	Conduct survey of adjunctive services available at the University of Nebraska and in the community.	1	Survey completed for 1987-88. Survey Report available.
2.42	Arrange cooperative agreements between Center and identified adjunctive service organizations.	1	Cooperative agreements completed with University and Local/State agencies. Further agreements in negotiation.
2.51	Develop evaluation plan for Center activities.	1	1987-88 Evaluation Plan update completed. Plan available.

Program Objective	Status	Product or Comment
2.52 Evaluate Center and Center activities.	1	Third year summative evaluation completed. Evaluation Report available.
2.6 Obtain additional funding for the Center.	1	Software grant obtained from IBM. Grant to test interactive videodisc obtained. Grant for network system obtained.

Status Codes

1 = Completed satisfactorily as planned
2 = Completed satisfactorily - deviated from plan
3 = Activity abandoned
4 = Not completed satisfactorily

3.0 Goal: Disseminate Model Project Information.

	Program Objective	Status	Product or Comment
3.1	Publish newsletter on Center activities.	2	One third year newsletter completed. AHSSPPE SIG newsletter begun.
3.2	Compile dissemination materials on Center and Center activities for publication and presentation.	1	Working papers in progress for needs assessment, interventions, evaluation, and Replication Manuals.
3.3	Provide information on adaptive hardware/software and training to education and service professionals.	1	Seven third year presentations completed. One future presentations accepted. Five publications completed. Eight manuscripts in-progress. Publications, conference papers, and working papers available.
3.4	Provide information about the Center to prospective students and parents.	1	Continued consultation with students and parents. Center information integrated with other University information sources.
3.5	Educate the business community concerning adaptive hardware/ software for the work place.	2	IBM brochure distribution continued. Work with IBM Hotline for Handicapped continued. One business community presentation completed.
3.6	Provide internship opportunities at the Center for students interested in disability and rehabilitation issues.	1	5 interns from special education and 1 intern from school psychology placed in Center during third year. Four disabled students placed in business community internships.

Program Objective	Status	Product or Comment
3.7 Conduct testing of prototype adaptive hardware/software.	1	Testing of portable workstation/communication system, Morse code entry, and interactive videodisc conducted during third year.

Status Codes

1 = Completed satisfactorily as planned
2 = Completed satisfactorily - deviated from plan
3 = Activity abandoned
4 = Not completed satisfactorily

Evaluation Plan
Final Summary Report

1.0 Goal: Improve Student Academic Performance and Attitudes.

	Program Objective	Status	Product or Comment
1.1	Evaluate student needs for adaptive hardware/software training in academic areas.	2	Evaluations obtained for all first and second year students. Partial evaluations obtained for all third year students.
1.2	Provide training in adaptive hardware/software for areas identified in evaluation.	2	Individual training provided all years. Classes not implemented.
1.3	Provide training in academic skill areas identified in evaluation.	1	Individual skill training instruction provided all years. Cognitive skills class initiated during third year.
1.4	Evaluate student progress in use of adaptive hardware/software and development of academic skills.	1	Use logs for time on equipment and software implemented all years. Evaluation completed all years.
1.5	Evaluate educational progress of students in the program.	1	Evaluations completed January 1987 and July, 1988. Report available.
1.6	Evaluate progress in student writing resulting from use of adaptive hardware/software.	3	Activity suspended in 1986-87.
1.7	Evaluate student attitudes toward school and perceptions of ability to perform school related tasks.	2	Outside evaluation completed first and second years. Discontinued third year. ECDS follow-up survey completed July, 1988. Reports available.

Status Codes

1 = Completed satisfactorily as planned
2 = Completed satisfactorily - deviated from plan
3 = Activity abandoned
4 = Not completed satisfactorily

2.0 Goal: Establish Educational Center for Disabled Students.

	Program Objective	Status	Product or Comment
2.11	Conduct adaptive hardware/ software needs assessment for student population in program.	1	Population demographics and needs summary completed each year.
2.12	Conduct educational needs assessment for student population in program.	1	Educational needs summary completed each year.
2.21	Conduct assessment of available adaptive hardware and software for meeting needs identified in needs assessment.	1	Assessment completed each year. Bibliography and vendor list available.
2.22	Conduct assessment of available educational software for meeting needs identified in needs assessment.	1	Assessment completed each year. Bibliography and vendor list available.
2.31	Obtain adaptive hardware and software to meet identified needs.	2	Basic equipment and software obtained. Replication materials in progress. Inventory available. Deviations discussed in 1985-86 Final Report.
2.32	Obtain educational software to meet identified needs.	1	Typing, study skill, and general knowledge software obtained. Cognitive skill materials tested. Inventory available.
2.41	Conduct survey of adjunctive services available at the University of Nebraska and in the community.	1	Survey completed for all years. Survey reports available.
2.42	Arrange cooperative agreements between Center and identified adjunctive service organizations.	1	Cooperative agreements completed with University and Local/State agencies. Further agreements in negotiation.
2.51	Develop evaluation plan for Center activities.	1	Evaluation Plan developed first year. Annual updates completed.

Program Objective		Status	Product or Comment
2.52	Evaluate Center and Center activities.	1	Evaluations completed each year. Reports available.
2.6	Obtain additional funding for the Center.	1	Software grant obtained from IBM. Grant to test interactive videodisc obtained. Grant from University of Nebraska Foundation Obtained. Grant for network system obtained. Grant from Digital Equipment Corporation obtained.

Status Codes

1 = Completed satisfactorily as planned
2 = Completed satisfactorily - deviated from plan
3 = Activity abandoned
4 = Not completed satisfactorily

3.0 Goal: Disseminate Model Project Information.

	Program Objective	Status	Product or Comment
3.1	Publish newsletter on Center activities.	2	Newsletters published first and second year. Discontinued third year. AHSSPPE SIG newsletter begun third year.
3.2	Compile dissemination materials on Center and Center activities for publication and presentation.	1	Dissemination materials updated each year. Working papers updated each year. Replication Mannual and final publication materials scheduled for completion spring, 1989.
3.3	Provide information on adaptive hardware/software and training to education and service professionals.	1	Twelve national and four regional conference presentations have been made and one additional national presentation has been accepted. Ten publications have been made. Replication Manual available spring, 1989.
3.4	Provide information about the Center to prospective students and parents.	1	Brochure complete and Newsletter disseminated Center integrated with Handicapped Services and other University information sources.
3.5	Educate the business community concerning adaptive hardware/ software for the work place.	2	Program brochure with IBM completed. Work with IBM Hotline for Handicapped continued. Presentation to area business group made.
3.6	Provide internship opportunities at the Center for students interested in disability and rehabilitation issues.	1	Interns placed in Center each year of operation. Disabled students placed in community internships. Cooperative work with University Internship Office ongoing.

Program Objective	Status	Product or Comment
3.7 Conduct testing of prototype adaptive hardware/ software.	1	Testing of portable communication systems, optical scanning, and interactive videodisc, and Morse code entry conducted during project. Testing of information access network to begin January, 1989.

Status Codes

1 = Completed satisfactorily as planned
2 = Completed satisfactorily - deviated from plan
3 = Activity abandoned
4 = Not completed satisfactorily

EDUCATIONAL CENTER FOR DISABLED STUDENTS
SUMMATIVE EVALUATION

Program Goal 1.0 - Improve student academic performance and attitudes

Objective 1.5 - Evaluate educational progress of students in the program

EVALUATION OBJECTIVE	MEASUREMENT		DATA COLLECTION		DATA ANALYSIS	
	INSTRUMENTS	BASELINE	METHOD	SCHEDULE	DESIGN	GROUPS/MEASURES
1. Reduce drop-out rate for disabled students to levels equivalent to non-disabled student population	UNL Records	Current drop-out rates	Obtain average UNL drop-out rate and calculate drop-out rate for center students and general disabled population.	Annually - January	Between Groups Comparison	1a. General student population 1b. Center students 2a. General disabled population 2b. Center students
2. Increase percentage of disabled students admitted to the university	UNL Records	Current admission percentages	Obtain number of admissions for all students and for disabled students and calculate annual percentage	Annually - January	Pre - Post comparison	1a. Percentage previous year 1b. Percentage current year
3. Increase overall grade average for students in center	UNL Records	Current cummulative GPA for center students	Obtain GPA for each center student and compute average GPA	Annually - January	Pre - Post Comparison	1a. GPA previous year 1b. GPA current year
4. Increase semester credit hour load to levels equivalent to non-disabled student population	UNL Records	Current credit hour loads for disabled and non-disabled students	Obtain average credit hours per semester for all UNL students. Obtain credit hours per semester for each student in center and average.	Annually - January	Between Groups Comparison	1a. General student population 1b. Center students

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EDUCATIONAL CENTER FOR DISABLED STUDENTS
SUMMATIVE EVALUATION

Program Goal 1.0 - Improve student academic performance and attitudes

Objective 1.7 - Evaluate student attitudes toward school and perceptions of ability to perform school related tasks

EVALUATION OBJECTIVE	MEASUREMENT		DATA COLLECTION		DATA ANALYSIS	
	INSTRUMENTS	BASELINE	METHOD	SCHEDULE	DESIGN	GROUPS/MEASURES
1. Decrease time spent on mechanics of school related tasks	Attitude survey Questionnaire	Intake survey score	Collect attitude survey questionnaires from all students in program. Compile group average for time spent in educational tasks.	Beginning of each school year - Sept.	Pre - Post Comparison (Annual)	1a. Time beginning of previous year 1b. Time beginning of current year
					Pre - Post Comparison (Initial)	2a. Time at intake 2b. Time last survey
2. Improve student self perception of academic ability	Attitude survey Questionnaire	Intake survey scores	Collect attitude survey questionnaires from all students in program. Compile group average for self perception of academic ability	Beginning of each school year - Sept.	Pre - Post Comparison (Annual)	1a. Perceptions beginning of previous year 1b. Perceptions beginning of current year
					Pre - Post Comparison (Initial)	2a. Perceptions at intake 2b. Perceptions last survey
3. Improve student attitudes toward school	Attitude survey Questionnaire	Intake survey scores	Collect attitude survey questionnaires from all students in program. Compile group average for attitudes toward school.	Beginning of each school year - Sept.	Pre - Post Comparison (Annual)	1a. Attitudes beginning of previous year 1b. Attitudes beginning of current year
					Pre - Post Comparison (Initial)	2a. Attitudes at intake 2b. Attitudes last survey

EDUCATIONAL CENTER FOR DISABLED STUDENTS
INTAKE NEEDS ASSESSMENT

Name: Sex:

Social Security No.: Date of Birth:

Assessment Date: High School GPA:

College: Major:

ACT: Eng: Math: SS: NSc: Com:

GPA at Entry: Current GPA:

DISABILITY CLASSIFICATION

Primary: Code#:
Secondary: Code#:
Other: Code#:

DISABILITY INFORMATION

PHYSICAL

Hand Usage (L,R,B,N):
Coordination:
Fatigue:

Finger Usage
Left Hand (Y,N):
Identify:
Coordination:
Fatigue:

Right Hand (Y,N):
Identify:
Coordination:
Fatigue:

Other Mobility
Arm Usage (L,R,B,N):
Coordination:
Fatigue:
Foot Usage (L,R,B,N):
Coordination:
Fatigue:
Head Mobility (Y,N):
Fatigue:
Eye Blink (Y,N):
Fatigue:

General Body Fatigue
Standing:
Sitting:

HEARING

Ability (H,M,L,N):
Aids Used
Hearing Aid (Y,N):
Lip Reading (Y,N):
Signing (Y,N):
Other:

VISION

Ability (H,M,L,N):
Aids Used
Specify:

Other Visual Problems
Specify:

SPEECH

Ability (H,M,L,N):
Aids Used:

LEARNING DISABILITY

Perceptual Problems (Y,N):
Specify:
Severity (H,M,L):

General Disability (Y,N):
Specify:
Severity (H,M,L):

Mental Fatigue (Y,N):
Max. Work Time:

Reading (Y,N):
Specify:
Severity (H,M,L):

Other Language (Y,N):
Specify:
Severity (H,M,L):

On Task Problems (Y,N):
Specify:
Max. Work Time:

EDUCATIONAL ASSESSMENT

Reading
Level (H,M,L,N):
Impairments
Physical (Y,N):
Visual (Y,N):
L.D. (Y,N):
Hearing (Y,N):

Writing
Level (H,M,L,N):
Impairments
Physical (Y,N):
Visual (Y,N):
L.D. (Y,N):
Hearing (Y,N):

Study Skills
Level (H,M,L,N):
Impairments
Physical (Y,N):
Visual (Y,N):
L.D. (Y,N):
Hearing (Y,N):

Typing
Level (H,M,L,N):
Impairments
Physical (Y,N):
Visual (Y,N):
L.D. (Y,N):
Hearing (Y,N):
Touch Type (Y,N):

Notetaking
Level (H,M,L,N):
Impairments
Physical (Y,N):
Visual (Y,N):
L.D. (Y,N):
Hearing (Y,N):

Computer Usage
Level (H,M,L,N):
Impairments
Physical (Y,N):
Visual (Y,N):
L.D. (Y,N):
Hearing (Y,N):

COMPUTER SKILLS

Word Processing
PFS Write (Y,N):
Word Perfect (Y,N):
Other (Y,N):
Specify:

Spread Sheets
PFS Plan (Y,N):
Lotus (Y,N):
Other (Y,N):
Specify:

General
Autocad (Y,N):
PFS Plan (Y,N):
Other (Y,N):
Specify:
Specify:

Operations Ability
Start-Stop (Y,N):
Insert Disks (Y,N):
Operate Printer (Y,N):
Drive Assignments (Y,N):

General Operations Knowledge
Drive Assignments (Y,N):
Format/Copy (Y,N):
Boot Program (Y,N):
Save Files (Y,N):

RECOMMENDATIONS

Equipment:

Educational:

Thank you for your interest in our project at the Educational Center for Disabled Students. I am enclosing copies of our assessment instrument and the technological, adaptive and skill training interventions utilized in the Center. I hope this information can help you.

The assessment and interventions described in this material are oriented toward the specific purpose and situation of the Educational Center. Our focus is on supplying disabled students with computer technology that can facilitate their educational work. Cognitive and other skills training is used to allow the student to make better use of the technology available.

Students enter the Center through the Handicapped Services office at the University of Nebraska-Lincoln. Because eligibility is established through this office, the Center does no independent diagnosis for classification or determination of type or severity of disability. Assessment is done in the context of the services provided by the Center. Our assessment is, therefore, oriented toward establishing ability to access and use computer equipment, ability to gain information in the educational setting through reading and listening, and ability to produce written materials required for classes.

The Center's assessment and treatment are organized within an information processing model called IPO (Input - Processing -Output). The IPO Model represents a conceptual framework for organizing assessment and treatment, rather than a specific assessment or treatment methodology. Thus, the model provides a framework in which to use existing assessment techniques and to identify where new instruments or methods may be needed. Within the IPO Model questions are oriented to determining needs related to receiving information (input), organizing and storing information in memory (processing), and expressing information (output).

The input question is answered by assessing perceptual reading and listening ability to determine if information can be understood in these sensory modes. If the student is unable to read or hear due to a sensory/perceptual problem (e.g. visual impairment, dyslexia, hearing impairment), then the next step is to isolate the nature of the problem. Once isolated the problem is addressed by treatments designed either to help alleviate the problem directly or to compensate for the problem by providing alternative means of input (as in the case of the technological interventions used in the Center).

Processing problems are assessed by examining the students ability to transform, store, and organize information once it has been obtained. Again, the focus of assessment is to isolate, as much as possible, the specific type of processing

problem that exists. Once the problem is isolated, treatment is oriented toward training in alternative processing methods or alleviation of the problem.

Output problems are assessed by examining the writing and speech of the student. The question addressed is whether the person i able to express known information in a form that is understandable by another person. If difficulties in expression are identified, then assessment is continued to try to define the exact nature of the problem. Treatment, again, may be directed at alleviating the problem (e.g. speech therapy) or at providing alternative means of expression (e.g. computerized speech output or word processing/proofing software).

The concept of the Model that guides all of these assessment and treatment activities is the isolation of problems in terms of their impact on input, processing or output. Once a problem is isolated in one or more of the parts of the information processing system, further assessment is done to try to determine the specific nature of the problem and its severity. Treatment(s) are then selected based on the specific problem area, compensate for the problem or both. It is presumed that existing instruments could be organized within this framework to do much of the assessment.

Since we are not oriented toward trying to treat problems directly, we do not engage in assessment beyond identification of where our compensatory interventions might be helpful and where referral to other services might be useful. The particular Needs Assessment instrument enclosed is used to determine input needs, output needs and necessary adaptive intervention to allow computer access. The Disability Information section is used to identify alternative accessing needs related to the interventions used in the Center. The Educational Assessment section is used to determine input, processing and output needs related to the technological and skill training interventions available in the Center. The Computer Skills section is used to assess background in computer use and needed computer training.

The physical disability information is used to determine keyboard accessing ability and potential ability to use alternative assess (e.g. eye switch, head stick). Hand and finger usage can be assessed by verbal interview and by having the person type on a standard keyboard. Usage indication is for Left, Right, Both or None. Coordination and fatigue are noted by short comments.

Hearing, Vision and Speech section assess general ability level (High, Medium, Low, None) either through interview or through arranged formal testing. Comments on particular aspects of ability can be appended following the indication of level. Aids Used specifies existing helps the person is

utilizing (e.g. glasses, braille reading, lip reading, etc.).

The Learning Disability section is used to assess the existence of different types of learning disability, the severity (High, Medium, Low) and allow specification of the particulars of the problem(s). Again, the assessment is initially done by interview and may be augmented by specific arranged testing for more formal diagnosis.

The Educational Assessment section addresses the impact of disability on educational activities related to input, processing and output of information in the educational setting. For each area the performance level is assessed (High, Medium, Low, None) through self-report and, if needed, through additional formal testing (e.g. a reading diagnostics test or typing test). Particular relevant impairments are noted for each educational area (Yes, No), and short comments are used to detail the specific impact of the disability on performance.

The Needs Assessment form is supplemented by additional assessment activities. First, a writing sample is obtained from each student. This sample is analyzed for both writing mechanics and organization of information. This provides specific information on writing ability and needed writing instruction. It also provides general processing related information on the student's organizational skills and needed training in these areas. Second, ACT scores and high school transcripts are analyzed to identify areas where background knowledge may be lacking. General knowledge instruction and/or tutoring may be indicated if the student lacks the background information needed for a particular class.

I hope this letter and the enclosed materials are of use to you. If you have any further questions or any suggestions, please feel free to contact the Center. We will try to provide you with any materials and information that we have. Thank you again for your interest in the Center.

ECDS STUDENT USER QUESTIONNAIRE SURVEY RESULTS

1. Student Demographics

	Number	Percent
Physical Disability	16	50
Visual Impairment	6	19
Hearing Impairment	3	9
Speech Impairment	1	3
Learning Disability	6	19
Total	32	

2. Center Use

	Number	Percent
Daily	2	6
2-4 times per week	9	28
Once per week	6	19
Once every 2 weeks	5	16
Once per month	5	16
2-4 times per senester	3	9
Once per semester	2	6
	32	

3a. Computer Services Ratings

		User Ratings					
		Very Helpful		Somewhat Helpful		Not Helpful	
	% Using	N	%	N	%	N	%
a. Word Processing	62	17	85	3	15	0	0
b. Spell Checking	53	13	77	4	23	0	0
c. Test Taking on Computer	16	3	60	2	40	0	0
d. Enlarged Print Monitor	13	4	100	0	0	0	0
e. Voice Output	0	-	-	-	-	-	-
f. Portable - Notetaking	3	0	0	1	100	0	0
g. Portable - In-class Writing	1	1	100	0	0	0	0
h. Computer Operation Training	50	13	81	3	19	0	0
i. Word Processing Training	41	11	85	2	15	0	0
j. Help with Operation	56	15	83	2	11	1	6
k. Help using Programs	56	15	83	3	17	0	0
l. Other	13	4	100	0	0	0	0

3b. Academic Services Ratings

	% Using	User Ratings: Very Helpful N	Very Helpful %	Somewhat Helpful N	Somewhat Helpful %	Not Helpful N	Not Helpful %
a. Paper Writing Assistance	34	7	64	3	27	1	9
b. Help Proofreading	34	8	73	2	18	1	9
c. Help Using the Library	16	2	40	2	40	1	20
d. Study Assistance	28	4	44	3	33	2	22
e. Tutoring	25	4	50	2	25	2	25
f. Cognitive Skills Course	22	1	14	4	57	2	29
g. Other	9	2	67	0	0	1	33

3c. Other Services Ratings

	% Using	User Ratings: Very Helpful N	Very Helpful %	Somewhat Helpful N	Somewhat Helpful %	Not Helpful N	Not Helpful %
a. Assistance with Notetakers	34	8	73	3	27	0	0
b. Copying Notes	34	6	55	5	45	0	0
c. Tests Taking in ECDS	38	12	100	0	0	0	0
d. Registration/Drop & Add	88	28	100	0	0	0	0
e. Assistance with Instructors	69	19	86	3	14	0	0
f. Taped Book Assistance	22	6	86	1	14	0	0
g. Financial Aid Assistance	47	12	80	3	20	0	0
h. Other	16	4	80	0	0	1	20

4. What ECDS services do you believe have been most helpful to you and why?

Learning Disabled

1. Help with registration and proofing
2. Cognitive skills, I learned to recognize what the instructors will want to know on tests, etc.
3. Registration/Drop & Add, because I can spend more time concentrating on school. Also, test taking helped very much.
4. Learning how to use the word processor. Taking my tests in the Center and having them proof read for me.

Visually Impaired

1. Guidance in adjusting to the complex system for registration. Provided useful information when it was needed, worked with my academic counselor successfully when it was needed. It helped cut down on the confusion of the university system.

2. It's a welcome place in the university where I have learned a vast amount of information about computer use and lots of help learning the easiest, best ways. I believe there is a very big increase in demand for this technology. It made the difference between C's and A's for me. I knew I was capable of A work but never before had the opportunity.
3. Taking tests, can't see copies.
4. Large print computer, unable to see other screen. Enrollment in proper classes.
5. Test taking services, taking a test in their office lets me complete the exam fully. There is no way with my vision I could finish the exam in the classroom in the 50 minute time period, plus, they blow up the exam.

Hearing Impaired

1. Because I now have a computer at home I don't come by as much for computers but they were very helpful. Mostly, I appreciate the services that the ECDS has when dealing with the university, like with instructors, registration (who to take, what to take, etc.). It makes things much easier.
2. Computers/word processor, assistance and moral support of staff, Thanks.
3. Counseling.

Speech Impaired

1. The notetaker services. I have some difficulty with discrimination of speech so I cannot understand every word professors say.

Physically Disabled

1. Getting the classes I need.
2. ECDS is most help in all areas. My class last year did require most services.
3. Changing class schedules, getting software and machines, course selections.
4. The computers, they are helpful in all areas.
5. All services provided were all so helpful it would be difficult to choose the most helpful.
6. The help with registration. You can ask advice and find out which buildings are accessible.
7. The personal one on one assistance I received from Christy gave me confidence to go for what I believe.
8. Having the access to the computers has been very helpful. It has enabled me to write and type papers for class. The other computer rooms are not convenient.
9. The ability to take the tests on the computer, because I know from experience the difficulty of taking a test verbally and I usually require more time than is allowed in class.

10. Opportunity to use word processor, help with registration saves me a lot of time and hassles. Help proof reading papers because my grammar and punctuation aren't that good.
11. Computer, it makes typing papers much easier. Drop/add is less of a hassle.
12. Advice, when I asked for help to improve I was sent to Academic Success Center. When I needed more help, I found the S.O.S. program on my own. [Note: this person indicated that they used the ECDS once in the last year].

5. Have the services at the ECDS helped you do better in your school work?

	N	%
Yes	25	78
No	7	22

How has the ECDS helped?

Learning Disabled

1. Someone to talk to.
2. It taught me how to pick important things out of text material. [Cognitive Skills Class]
3. I'm off all UNL probation and Business School probation. Christy has also been a great one for moral support.
4. On my test taking.

Visually Impaired

1. I could write what was in my head, not worry about mechanics or corrections until I was through the creative part. It gave me confidence that I could turn in an excellent looking perfectly spelled paper.
2. Needed some place to take tests.
3. Being able to take oral tests and the large print computer.
4. Tutoring was helpful, especially in math.
5. They are my security at UNL. If you have a problem with a course, they are there to help you with it.

Hearing Impaired

1. With use of computers, notetakers, copying notes, and selection of instructors.
2. Computer helps organize and proof assignments. Assistance from personnel has been invaluable in a variety of tasks.
3. It has helped me by eliminating many worries.

Speech Impaired

1. The notetaking services are the most helpful.

Physically Disabled

1. It has helped me complete papers on time for class.
2. In test taking, problems with classes, etc. It's good to know your there.
3. Without help from ECDS, I could not have handled school at all.
4. Could not have continued at UNL without.
5. By providing equipment and aid for me to do my homework.
6. In some classes, computer work is required. The computers in the ECDS are very helpful.
7. The easy access to computers, printers for the many reports that must be typed.
8. Convenient hours, computer usage, assistance there when needed.
9. For test taking and paper writing, also for registration.
10. Your proof reading papers has helped me get a higher grade.

6. Have the services at the ECDS helped you feel more confident about succeeding in school?

	N	%
Yes	25	78
No	7	22

How has the ECDS affected your confidence?

Learning Disabled

1. I was a little nervous about handling college courses but through the ECDS I found I could handle college and it's very nice to know if I'm having a problem there is always someone I can call.
2. I don't feel so nervous now.
3. It has improved everything about how I operate and what I get done.
4. On my tests.

Visually Impaired

1. Yes, it really helped my self esteem that could learn programs, boot and do the entire procedures on my own. It would not have happened without very patient, understanding staff, both grad assistants and Christy.
2. Has made school a reachable goal.
3. They tell how to study and study correctly and how to learn in school.

4. I know when I have a question or a problem, they can give the answers or aid to the solution of a problem.

Hearing Impaired

1. I don't feel so "handicapped" or at such a disadvantage.
2. Moral support when classes weren't going well. Advice on classes and various class projects have helped guide me into areas where I can achieve better.

Speech Impaired

1. I know that you are there in case things get out of hand or a professor is a difficult person to talk to.

Physically Disabled

1. By helping with class rooms I can get to.
2. I look around and see some of my fellow students are better off than I am physically and some are worse. If they can make it, so can I. Their being there is an encouragement.
3. To see that other like me have the same goal.
4. Positive attitude, encouragement.
5. Just the atmosphere and the people you work with.
6. By giving me the assistance and knowledge that I can succeed.
7. The people who work there will help if needed. You have someone to rely on for help.
8. It has given me the will to go out and see what is available for me.
9. With the use of word processing, papers are easier to complete.
10. Knowing how to operate computer software has made me feel more marketable in the job place.

7. Have the services at the ECDS helped you be more productive and efficient in studying and completing assignments?

	N	%
Yes	15	48
No	16	52

How have the services at the ECDS helped?

Learning Disabled

1. The services really helped me with my composition classes. I get stuck awful easy when writing papers and everyone has been helpful.

2. Example: Lilly gave me an A in Math 100, this was because I studied much better.

Visually Impaired

1 Because I record my notes on tape, its time consuming to listen to all of them before a test. I always do better once the highlights are printed on the computer.
2. By giving test and vocabulary.
3. Again the computer is a great help as well as other services.
4. They tell me what the profs need and are looking for in their assignments.

Hearing Impaired

1. Assistance on assignments and projects for classes; Christy's study classes and the use of the used text books for extra reference resources.
2. They have helped me develop better study habits.

Physically Disabled

1. Finding help, where to go.
2. I'm able, with the equipment, to have my work done on schedule.
3. In required computer papers.
4. Without the facility, study habits would decline.
5. Convenient hours, computer usage, assistance there when needed.
6. It's the only assistance I have at the university.
7. I was told to go somewhere else [for tutoring] [Note: this person indicated that they used the ECDS once in the last year].

8. Has using a computer at the ECDS or your own computer to do writing helped you write better?

Percent Using		User Response N	%
62	Yes	17	85
	No	3	15

How has the computer helped?

Learning Disabled

1. If it wasn't for Word Perfect, My chances would not be as good.
2. I've learned to compose on the computer and that has made my paper writing much faster and easier.
3. Because I can use a spell check.

Visually Impaired

1. It freed me of the sin of error, the fear I'd have to correct a whole paper and retype. I'm a lousy typist but that was not a hindrance on the computer. Also, changing the order of ideas is very simple but especially doing a bibliography.
2. Spelling and form, time, neatness.

Hearing Impaired

1. Computers are God's blessing to the typing idiots like myself and for those of us who can't spell. Makes paper writing much easier.
2. Organization, legibility, proofing, editing, and efficiency of using the computer has decreased many hours of typing or word processing. It also provided access to a useful tool I did not previously have.

Speech Impaired

1. It is easier to add and delete words, sentences, or paragraphs. It is much easier to correct errors on computers than writing or typing on a regular typewriter.

Physically Disabled

1. It is much easier to change your mind on a computer.
2. Spell check allows more continuous thought.
3. With my physical disability, that is the only way I can write.
4. The computer has helped by having the screen in front of you and the easy ability it has to change a sentence or word to stress my point.
5. For test taking and paper writing.
6. I am able to compose papers at the key board of the computer. I am able to proof my own papers and change the format of the paper. I enjoy my writing now.
7. Much faster and more professional looking.

9. Has using a computer at the ECDS or your own computer to do writing helped you feel more confident about your writing ability?

Percent Using	User Response	N	%
62	Yes	15	75
	No	5	25

How has the computer affected your confidence?

Learning Disabled

1. You see it, you use a key board to write
2. It's much easier to get the words flowing when using a computer. For me, I feel more confident because I know I can insert words or sentences any time, but the greatest advantage is the spell check. I don't have to worry about misspelling words while I'm composing on the computer. The computer helps my writing to flow much smoother.
3. Because I don't recognize misspelled words and with the use of a spell check I feel confident in getting a good grade.

Visually Impaired

1. Immensely, the flow of ideas allowed to move with great speed without mechanical encumbrances, freed my creativity, my vocabulary in being more creative in design and use of my own best gifts.
2. Practice makes perfect.

Hearing Impaired

1. I can write much better because correcting mistakes and rewriting is much easier; therefore, I can put a better effort in then if I had to retype and retype over and over.
2. I have good writing skills but not the resources to work with.

Speech Impaired

1. The professors would not know the errors. I can save a lot of time when I need to add or delete without having to go through much frustration.

Physically Disabled

1. Spelling.
2. It has expanded my mind.
3. The computer program is easy to use and to understand.
4. With the use of word processing, papers are easier to complete.
5. I feel I can be more creative when I use a computer because it is much easier to write and make changes. I write more now and that has helped build my skills.

10. What do you like most about the ECDS?

1. The fact that I know I can always go there when I'm having difficulties and usually I can get help.

2. People are always willing to help you. The staff doesn't make you feel stupid, just in need of more assistance.
3. The people treat you well.
4. Having somebody on my side at UNL.
5. Let's make it clear, I would not have considered re-entering school without these services.
6. The people.
7. The large print computer.
8. The people are friendly and really care about you as a person. You feel good about working with them.
9. The test taking offices and the security of knowing they are there for help.
10. They are there to help if I needed it.
11. Services available to help survive the university system.
12. The entire program is excellent and the personnel are great. Sometimes I like to study there and it's nice to have someone to talk to and ask for help.
13. I like the people and the help they provide.
14. To know the services are available and that you are not alone.
15. The people.
16. I like coming in to chat once in a while and to meet people.
17. The use of the computers.
18. It's good to know your there.
19. Help understanding the UNL system, how to get the job done.
20. The quality of help.
21. Everything.
22. That the facility is there for the extremely handicapped.
23. People show concern for my succeeding in my studies.
24. Being able to schedule tests at any time.
25. Friendly service, am able to come in at any time and use the services and computer. I really appreciate your help with registration.
26. The friendly people who are dedicated to helping us in every way.

11. <u>What do you like least about the ECDS?</u>

1. It hasn't helped my grades and I'm not sure how it can.
2. It's not a very relaxing environment.
3. Coordinator needs about 10 helpers. She has a lot to do.
4. That there are not 3 other people like the coordinator.
5. The noise level.
6. I can't think of anything.
7. Nothing, I like it all.
8. Coordinator was always so busy.
9. I can't think of anything.
10. No smoking rule.
11. It's nothing but helpful.
12. Cannot think of any dislike at this point.
13. Getting there.

14. For some kinds of homework it's too noisy and there's too much confusion.
15. Sometimes I am ignored.
16. Not applicable.
17. Needs more funding, more computers.
18. Nothing.
19. Taking those reading and other tests. They were long and boring and I don't see how they will help.
20. It has to stay at the university and with all the budget cuts it frightens me that this could someday be cut and future students would suffer.
21. Being an older student going back to school, I could have had more help in getting back in the school system. Some of the programs for learning would have helped me but I was sent elsewhere. [Note: this person indicated using the ECDS once in the last year].
22. I am pleased with the Center.
23. During test taking there is too much confusion in the room with other people talking. Many times prescheduled appointments aren't met.
24. Need to keep track of what you have and where it is or who it is checked out to.

12. What improvements or additional services would you like to see in the ECDS?

Learning Disabled

1. A career placement testing process.
2. A better environment, a more comfortable area. [Refers to area for skill training classes]
3. For me to know everything the program can offer me.

Visually Impaired

1. Larger/more space, in which we would have 10-12 more computers adaptable for all different needs, so there is more than one enlarged visual and more portables.
2. Better ventilation combined with noise level standards.
3. Due to limited use of their services, I can't think of any improvements or additional services at this time.
4. More counselors.

Hearing Impaired

1. Can't think of any.
2. Some type of system to transcribe my class notes from my tape recordings would give me more proficiency and time.
3. I would like to see the ECDS not have to go through the Bureaucrats of the University to obtain our goals.

Speech Impaired

1. I don't use it enough to know the weaknesses of the services in the ECDS.

Physically Disabled

1. More help in the library with research materials. Or knowing how much help I can ask for and how much I'm expected to do myself. I would like to talk to other handicapped people in my field who have made it through school and are working now.
2. More computers, check out of computers. Would like to see UNL more sensitive to ECDS needs.
3. More help for Christy.
4. Improvements are to tell people in Nebraska of the facility. I come from central Nebraska and really stumbled into the program. The backing of this program is there if the Regents can speak for it. Thanks.
5. I do not know of any.
6. Mainly test taking procedures, there is to much confusion in the room with other people talking.
7. Better quality printer or laser printer.
8. What other computer programs (besides PFS Write) are available.
9. Having a limit of time on my feet, some other easier way to get through registration and some other administration necessities would be helpful and less painful. More information on what is available. To have phones available in all building and to be able to sit down and use them. Priority on classes to eliminate distance between classes. This may be more for the university but it would help. [Note: this person indicated using the ECDS once in the last year].

1987-88 ADJUNCTIVE SERVICES SURVEY

University of Nebraska-Lincoln

David R. Beukelman, Head Augmentative Communication Center	Provides consulting on computer technology for the disabled.
Academic Success Center	Provides tutoring for disabled students.
Internship and Cooperative Education Office	Provides internship opportunities in business settings.
Lois Schwab, Professor of Human Development and the Family	Provides internship students through rehabilitation program.
Kay King, Associate Professor of Human Development and the Family	Provides internship students through rehabilitation program.
Office of Registration and Records	Provides assistance in registering students and ensuring accessible rooms.
Office of Admissions	Provides listings of disabled students admitted to UNL.

Other State Agencies

Meyers Childrens' Rehabilitation Institute	Makes referrals to UNL of disabled students. Exchange of information.
Nebraska Department of Vocational Rehabilitation	Provides tuition remission to disabled students and has purchased some computer systems.
Nebraska Services for the Visually Impaired	Provides assistance to visually impaired students and advice on technology available.

Other Agencies

Lincoln Public Schools	Exchange of information on computer technology for disabled students.

Omaha Public Schools	Exchange of information on computer technology for disabled students.
League of Human Dignity	Provides services for disabled students.
Nebraska Wesleyan University	Exchange of information on services for disabled students.
Madonna Rehabilitation Hospital	Provides rehabilitation therapy for physically disabled students.

Name	Name	Name	Name	Name	Name
Date	Date	Date	Date	Date	Date
Time In	Time In	Time In	Time In	Time In	Time In
Time Out	Time Out	Time Out	Time Out	Time Out	Time Out
Total	Total	Total	Total	Total	Total
study	study	study	study	study	study
see Christy	see Christy	see Christy	see Christy	see Christy	see Christy
staff help	staff help	staff help	staff help	staff help	staff help
test/quiz	test/quiz	test/quiz	test/quiz	test/quiz	test/quiz
photocopy	photocopy	photocopy	photocopy	photocopy	photocopy
ECDS testing	ECDS testing	ECDS testing	ECDS testing	ECDS testing	ECDS testing
socialize	socialize	socialize	socialize	socialize	socialize
print only	print only	print only	print only	print only	print only
registration	registration	registration	registration	registration	registration
Christy's class	Christy's class	Christy's class	Christy's class	Christy's class	Christy's class
skill building	skill building	skill building	skill building	skill building	skill building
counseling	counseling	counseling	counseling	counseling	counseling
equipment	equipment	equipment	equipment	equipment	equipment
proofreading	proofreading	proofreading	proofreading	proofreading	proofreading
go-between	go-between	go-between	go-between	go-between	go-between
paper writing	paper writing	paper writing	paper writing	paper writing	paper writing
read text	read text	read text	read text	read text	read text
Prof. Write	Prof. Write	Prof. Write	Prof. Write	Prof. Write	Prof. Write
PFS write	PFS write	PFS write	PFS write	PFS write	PFS write
PFS WSKE	PFS WSKE	PFS WSKE	PFS WSKE	PFS WSKE	PFS WSKE
E-Z Keys	E-Z Keys	E-Z Keys	E-Z Keys	E-Z Keys	E-Z Keys
Word Perfect	Word Perfect	Word Perfect	Word Perfect	Word Perfect	Word Perfect
Apple Works	Apple Works	Apple Works	Apple Works	Apple Works	Apple Works
data base	data base	data base	data base	data base	data base
file program	file program	file program	file program	file program	file program
Typing Tutor	Typing Tutor	Typing Tutor	Typing Tutor	Typing Tutor	Typing Tutor

I - H

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TECHNOLOGICAL INTERVENTIONS

INPUT

Intervention	Equipment	Disability	Sensory or Motor Skill Transference	Description
Optical Text Scanning	IBM PC, Omni Reader	PI, HI	Physically manipulated print to screen output	Used to overcome limitations on manipulating printed material.
Optical Text Scanning Enlarged Screen	IBM PC, Omni Reader, VTEK Monitor	VI	Visual standard print to visual enlarged print	Used to access printed material that are too small to be seen.
Optical Text Scanning Voice Synthesis	IBM PC, Omni Reader, VOTRAX or DECTAlk	VI, LD	Visual print to spoken text	Used to access printed material that can not be seen or read.
Optical Text Scanning Braille Print	IBM PC, Omni Reader, Braille Printer	VI	Visual print to touch print	Used to access printed material that can not be seen.
Transcription	IBM PC or Apple IIe	HI	Spoken text to visual print	Used to access spoken material that can not be heard.
Transcription Voice Synthesis	IBM PC, VOTRAX or DECTALK	VI, LD	Visual print to spoken text	Used to access printed material that can not be seen or read.

OUTPUT

Word Processing	IBM PC, Apple IIe	All	Written script to keyboard entry	Used to allow production of written text.
Word Processing Proofing	IBM PC or Apple IIe, Proofing Software	PI, LD, HI	Written script to keyboard entry	Used to compensate for problems in writing mechanics.
Voice Communication System	IBM Convertible, VOTRAX	SI	Speaking to keyboard entry with voice output	Used to allow vocal communication.
Portable Notewriting System	IBM Convertible or TRS 80 Model 100	PI, LD, VI	Written script to keyboard entry	Used to allow production of written in class notes.
Portable Writing System	IBM Convertible, Printer	PI, LD, VI	Written script to keyboard entry	Used to allow in class writing.
Computer Assisted Design (CAD).	IBM PC, Mouse	PI	Physical drawing to keyboard or mouse entry	Used to allow drawing, drafting, etc.

ADAPTIVE INTERVENTIONS

Intervention	Device/Peripheral	Computer	Description	Purpose
Single Switch Input	Adaptive Firmware Card	Apple	Single switch input using alphabet scanning array.	Allow data entry to computer when keyboard entry not possible.
Single Switch Input	Words+ System	IBM	Single switch input using word scanning array.	Allow data entry to computer when keyboard entry not possible.
Alternative Keyboard	Unicorn Board	Apple	Word or alphabet entry using special function board.	Allow data entry to computer when keyboard entry not possible.
Morse Code Input	Words+ System	IBM	Sip/puff entry using Morse code system.	Allow data entry to computer when keyboard entry not possible.
Voice Output	VOTRAX or DECTALK Speech Synthesizers	IBM	Speech output of computer screen contents and typed commands.	Allow access to computer and screen output when reading screen not possible.
Enlarged Screen	VTEK Monitor	IBM	Screen contents displayed in large typeface.	Allow access to screen output when viewing normal screen not possible.
Braille Print	Braille Printer	IBM or Apple	Program and screen contents printed in braille.	Allow access to screen and program output when viewing screen not possible.
Guarded Keyboard	Keyguard	IBM	Keyguard placed over standard keyboard.	Eliminate drag across keys and allow locking of special purpose keys.
Altered Keyboard	ProKey Program	IBM	Keys reprogramed to enter commands or character strings.	Allow single keystroke entry of commands or special functions.
Abbreviated Input	ProKey Program or Productivity Plus Program	IBM	Macro's written to enter phrases with reduced keystrokes.	Allow entry of phrases or words with fewer keystrokes.
Supported Keyboard	Supports for arm/wrist	IBM or Apple	Supporting devices attached to keyboard.	Provide relief from fatigue in accessing keyboard and/or stabilize arm for control of keystrokes.

SKILL TRAINING/PROCESSING INTERVENTIONS

Intervention	Software/Training Materials	Description	Purpose
Typing Instruction	Typing Tutor	Training in keyboard skills.	Allow data entry on computer.
Writing Mechanics Instruction	Pro Sentence Pro Grammar	Training in writing component skills.	Improve readability of written work.
Writing Organization Instruction	Cognitive Skills	Training in writing content organization.	Improve organization and content of written work.
Writing Organization Instruction	Proteus HBJ Writer	Writing content organization practice.	Allow refinement of writing organizational skills.
Study Skills	Study Skills Program	Training in library skills and paper writing.	Improve use of library and paper writing techniques.
General Knowledge Instruction	Knowledge Master Program	Training in vocabulary and general knowledge.	Enhance background knowledge and vocabulary in basic subject fields.
Language Comprehension Instruction	Cognitive Skills	Training in reading and verbal comprehension.	Improve reading and lecture comprehension and memory for class material.

INITIAL POPULATION PROFILE

OCTOBER 1985

DISABLING CONDITION	UNL	PROJECT
Total Disabled Students	55	25
Visually Impaired	10	5
Acoustically Impaired	7	2
Brain Trauma	2	1
Learning Disabled	5*	3
Quadriplegic	11	8
Cerebal Palsy	5	3
Muscular Dystrophy	1	-
Muscular Atrophy	1	-
Multiple Sclerosis	1	-
Arthritis	1	1
Spinal Bifida	1	-
Other	10	2

* This number does not represent all Learning Disabled Students at UNL.

STUDENT UTILIZATION OF THE CENTER

JANUARY 1986

DISABILITY	APPLICATIONS	USAGE		
		COMPUTER	ACADEMIC	BOTH
Quadriplegic	8	2	2	4
Orthopedic	5	1	-	2
Visually Impaired	7	3	2	1
Learning Disabled	6	3	-	4
Hearing Impaired	4	-	2	1
Head Trauma	2	1	-	1
Cerebal Palsy	3	1	-	2
Arthritis	1	-	-	1
TOTAL	36	16	6	11

STUDENT UTILIZATION OF THE CENTER

JUNE 1986

DISABILITY	APPLICATIONS	USAGE		
		COMPUTER	ACADEMIC	BOTH
Quadriplegic	9	2	3	4
Orthopedic	6	2	-	2
Visually Impaired	8	3	3	1
Learning Disabled	10	3	-	7
Hearing Impaired	5	1	2	1
Head Trauma	2	1	-	1
Cerebral Palsy	4	1	-	3
Arthritis	1	-	-	1
Multiple Sclerosis	1	-	-	1
Multiply Handicapped	1	-	1	-
TOTAL	47	13	9	21

STUDENT UTILIZATION OF THE CENTER

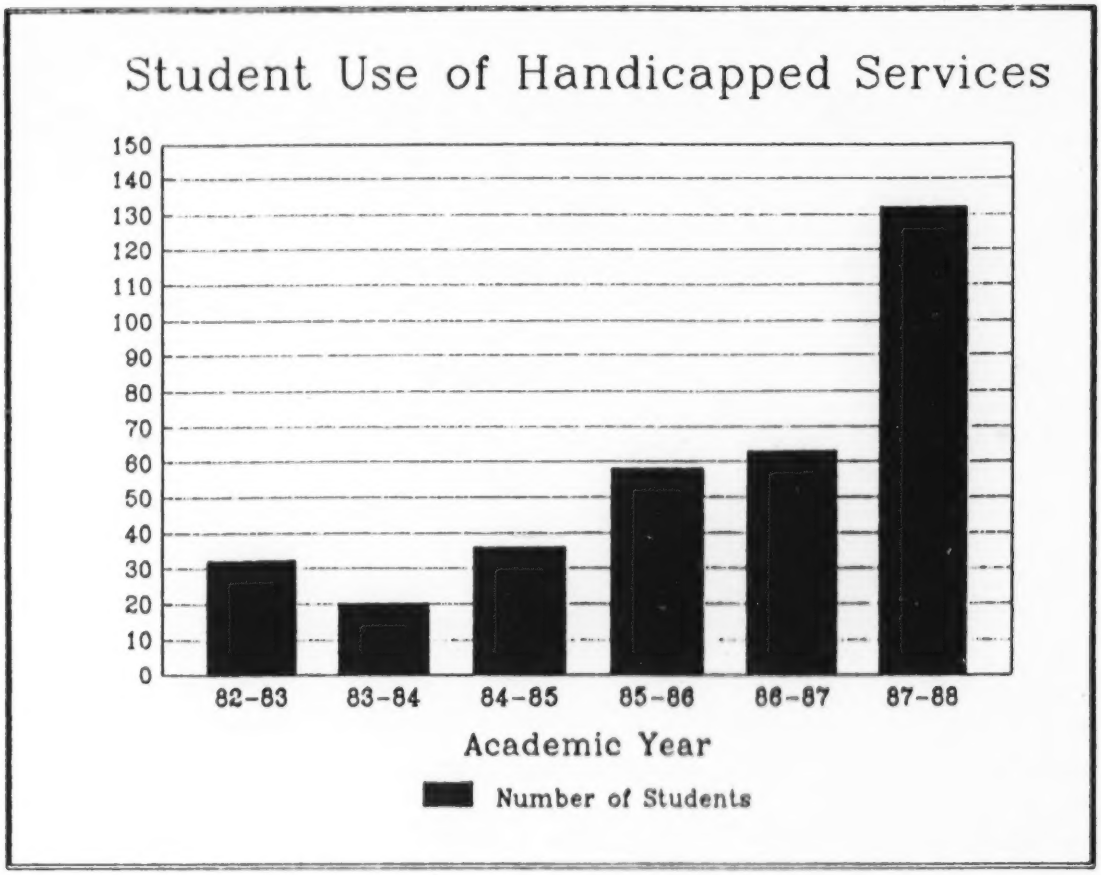
JANUARY 1987

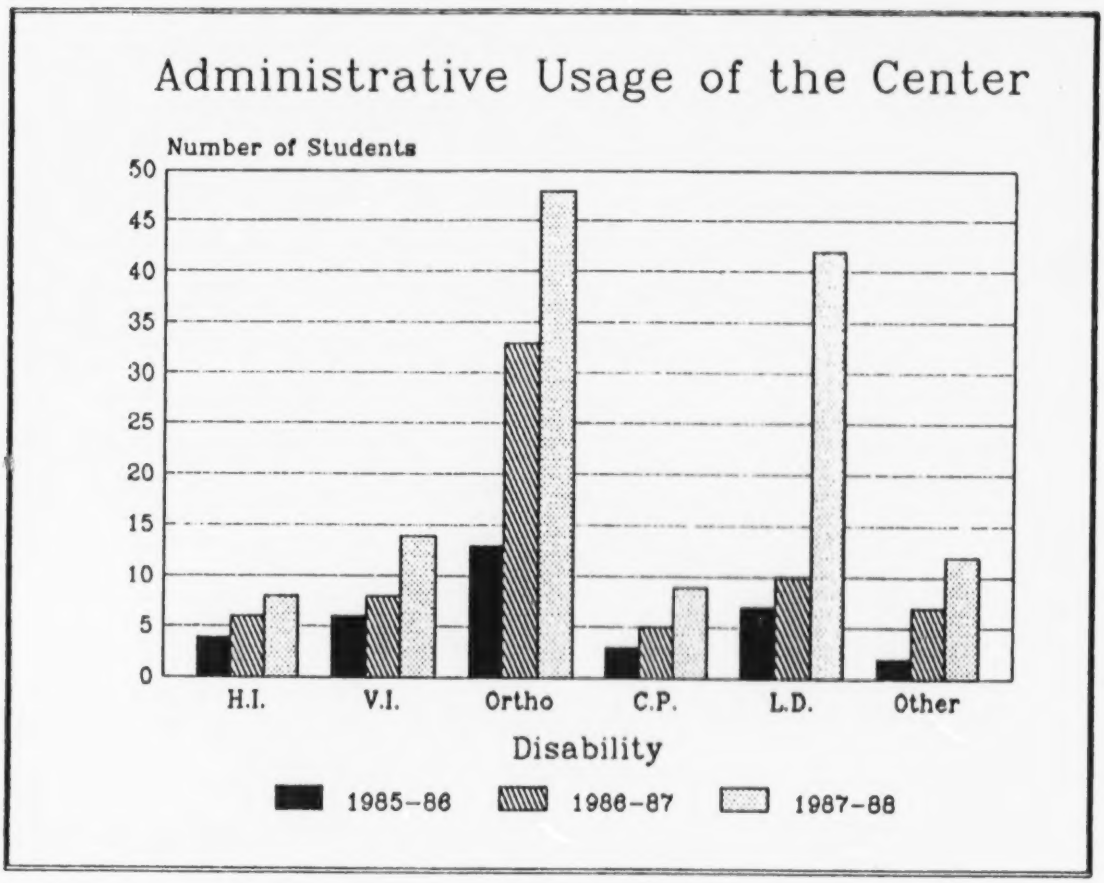
DISABILITY	USAGE		
	COMPUTER	ACADEMIC	BOTH
Quadriplegic	12	1	1
Paraplegic	1	-	-
Orthopedic	3	-	4
Visually Impaired	2	1	5
Learning Disabled	1	-	9
Hearing Impaired	2	1	4
Head Trauma	1	-	1
Cerebral Palsy	-	-	5
Arthritis	3	-	-
Multiple Sclerosis	1	-	1
Multiply Handicapped	3	-	-
Amputee	3	-	-
TOTAL	32	3	30

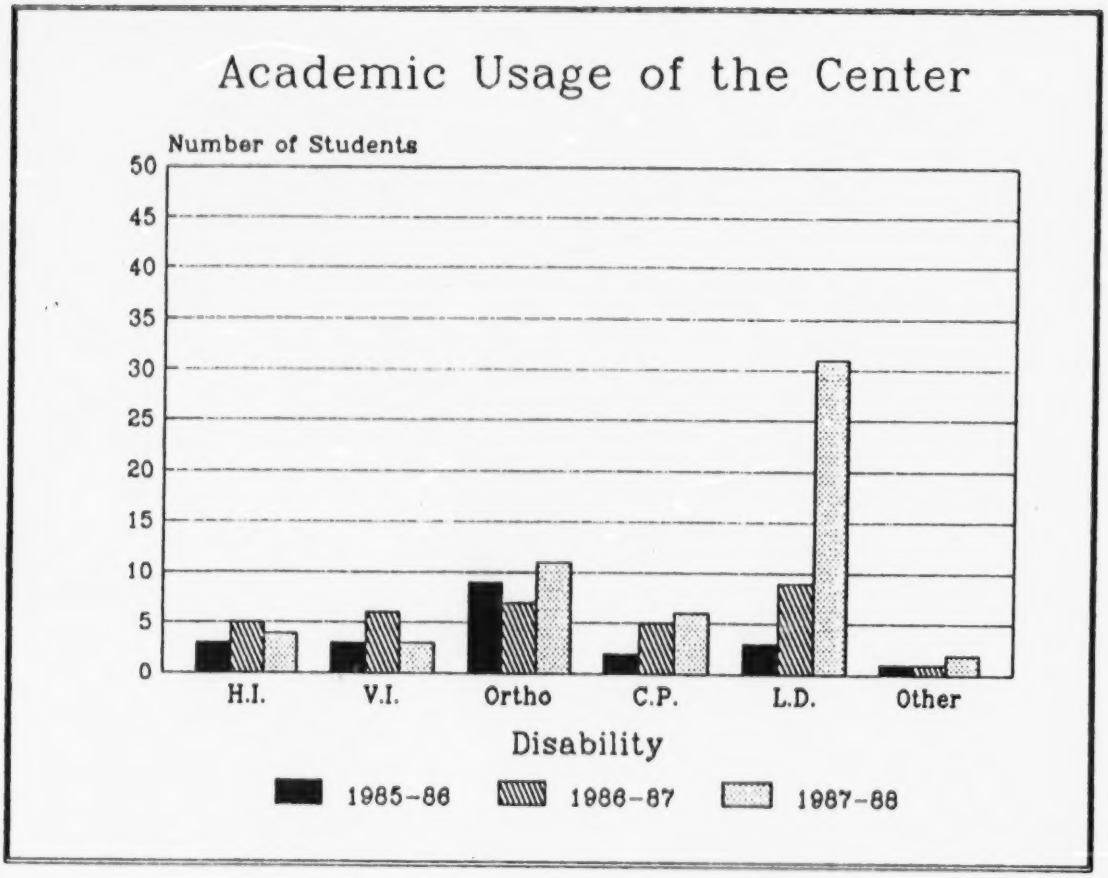
STUDENT UTILIZATION OF THE CENTER

January 1988

DISABILITY	USAGE		
	COMPUTER	ACADEMIC	BOTH
Quadriplegic	2	5	7
Paraplegic	-	-	1
Orthopedic	1	1	3
Visually Impaired	1	8	4
Learning Disabled	1	24	5
Hearing Impaired	1	3	2
Head Trauma	-	1	-
Cerebral Palsy	1	3	4
Arthritis	1	2	1
Multiple Sclerosis	-	1	2
Multiply Handicapped	3	-	-
Amputee	-	-	1
TOTAL	7	48	29


Student Use of Handicapped Services
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
82-83
83-84
84-85
85-86
86-87
87-88
Academic Year
Number of Students


Administrative Usage of the Center
Number of Students
50
45
40
35
30
25
20
15
10
5
0
H.I.
V.I.
Ortho
C.P.
L.D.
Other
Disability
1985-86
1986-87
1987-88


Academic Usage of the Center
Number of Students
50
45
40
35
30
25
20
15
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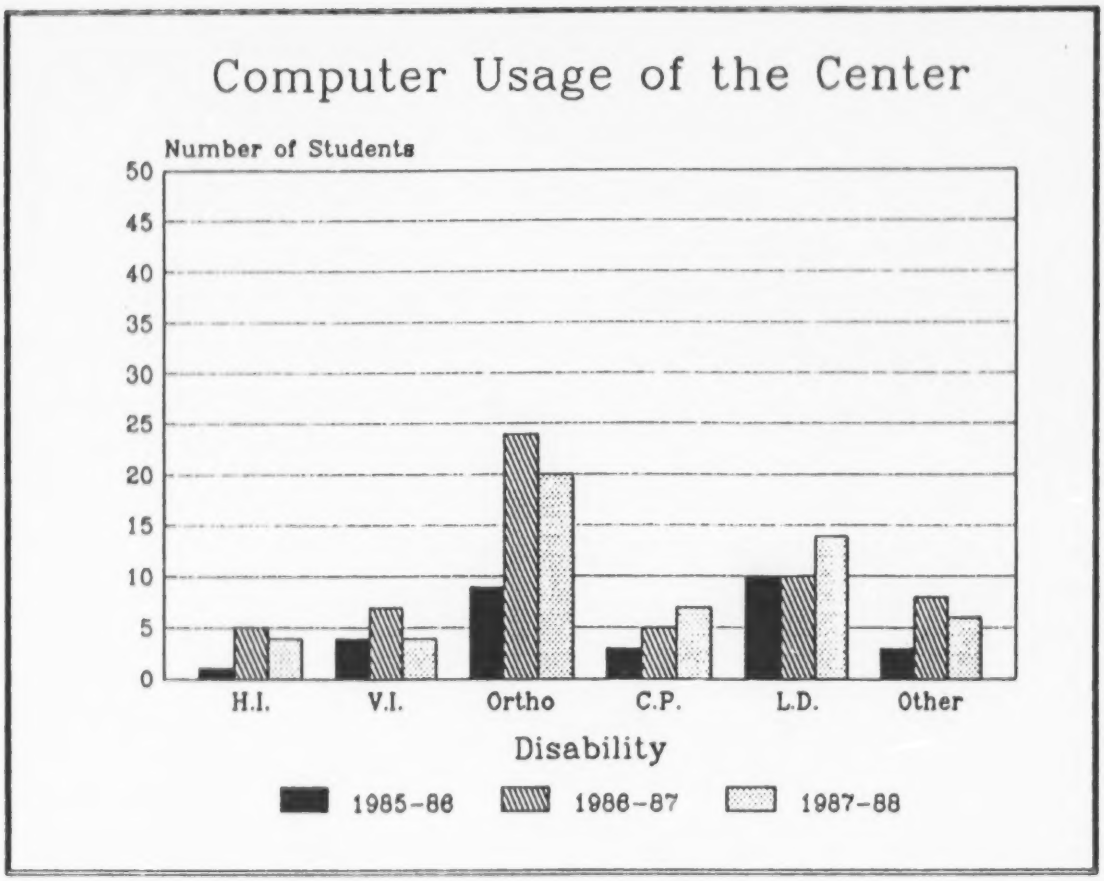
5
0
H.I.
V.I.
Ortho
C.P.
L.D.
Other
Disability
1985-86
1986-87
1987-88


Computer Usage of the Center
Number of Students
50
45
40
35
30
25
20
15
10
5
0
H.I.
V.I.
Ortho
C.P.
L.D.
Other
Disability
1985-86
1986-87
1987-88

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Closing The Gap, Box 68, Henderson, MN 56044.

IBM Educational Systems, 411 Northside Parkway, Atlanta, GA 30327 (Walter Dean).

Trace Research and Development Center on Communication, Control, and Computer Access for Handicapped Individuals, University of Wisconsin-Madison, 314 Waisman Center, 1500 Highland Avenue, Madison, Wisconsin 53706.

E.C.D.S. EQUIPMENT INVENTORY

Computers

Quantity/ Funding		Model	Configuration
(F)	3	Apple IIe	128K / Monitor
(F)	2	IBM PC	256K / Monitor / 2 Disk Drives
(F)	2	IBM PC Portable	256K / Monitor / 2 Disk Drives
(N)	3	IBM PC Portable	640K / Monitor / 2 Disk Drives
(F)	1	IBM PC XT	640K / Monitor / 2 Disk Drives / Hard Disk
(N)	1	IBM System 2 60	1 Meg/ Monitor / 1 Disk Drive / Hard Disk Disk
(N)	1	Words+ Living Center	640K / Monitor / 2 Disk Drives / Hard Disk
(F)	1	NCR First Step	64K / Monitor / 2 Disk Drives

Lap Top Computers

Quantity/ Funding		Model	Configuration
(F)	5	TRS 80 Model 100	16K / Monitor
(F)	1	IBM PC Convertible	256K / Monitor / 2 Disk Drives
(N)	2	Toshiba T-1100Plus	720K / Monitor / 2 Disk Drives

Printers

Quantity/ Funding		Model	Type
(F)	4	Panasonic KX-P1091	Dot Matrix
(F)	2	Apple Imagewriter	Dot Matrix
(F)	1	Epson LX-86	Dot Matrix
(F)	1	Epson FX-85	Dot Matrix
(F)	1	IBM Graphics Printer	Dot Matrix
(F)	1	NCR First Step	Daisy Wheel
(F)	1	IBM PC Convertible Printer	Dot Matrix

Miscellaneous

Quantity/ Funding		Model
(N)	1	Hayes Smartmodem 300
(N)	1	SmartLink Modem 1200
(F)	1	Amdec Monitor
(F)	1	Gold Star Monitor
(F)	3	Apple Disk Drives
(F)	1	Cannon 5 Star Typewriter

Adaptive Equipment

Quantity/ Funding		Model
(N)	1	VTEK Large Print Display Monitor
(F)	2	VOTRAX Person Speech System Voice Synthesizer
(N)	1	DECTALK Voice Synthesizer
(F)	2	Omni-Reader Optical Character Reader
(F)	1	Mouse Systems Mouse Input Device
(F)	2	Adaptive Firmware Card
(F)	2	Unicorn Board

F = Obtained with Federal Grant funds
N = Obtained with University of Nebraska funds

E.C.D.S. SOFTWARE INVENTORY

General Purpose Software

Funding/ Program Name	Computer	Description
(F) PFS Professional Write (Upgrade)	IBM	Word Processor / Proofreader
(F) PFS Write	Apple	Word Processor
(F) Word Perfect	IBM	Word Processor / Proofreader
(F) Magic Slate	Apple	Word Processor
(F) PFS Professional Plan (Upgrade)	IBM	Spreadsheet
(F) PFS Plan	Apple	Spreadsheet
(F) PFS Professional File (Upgrade)	IBM	Data Base
(F) PFS Report	IBM	Data File Report Writer
(F) PFS Graph	IBM	Graph Writing
(F) PFS Graph	Apple	Graph Writing
(F) PFS First Choice	IBM	Integrated Word Processing / Data File / Desktop Publishing
(F) Lotus Symphony	IBM	Integrated Spreadsheet / Word Processing / Data File
(N) Nutshell	IBM	Data Base Manager
(F) Apple Works	Apple	Integrated Word Processing / Data File
(F) Sensible Speller	Apple	Spelling Checker
(F) Newsroom	IBM/Apple	Clip Art/ Word Processing
(N) Crosstalk	IBM	Communications/Modem Operation
(F) Remote Control	IBM	Communications/Modem Operation
	TRS 80	Data Transfer

Educational Software

Funding/ Program Name	Computer	Description
(F) Typing Tutor III	IBM	Typing Instruction
(F) Knowledge Master	Apple	General Knowledge Instruction
(F) Study Skills	Apple	Research / Paper Writing Instruction
(F) Pro Sentence	Apple	Instruction in sentence writing
(F) Pro Grammar	Apple	Grammar Usage Instruction
(F) EZ Pilot II	IBM	Educational Course / Test Authoring Program
(F) MPALS	IBM	Authoring / Educational Course Development Program
(F) abcWord	IBM	Information Reference / Dictionary / Thesarus

Special Purpose Software

Funding/ Program Name	Computer	Description
(F) Proteus	IBM/Apple	Writing Organization/Outlining
(F) Rightwriter	IBM	Grammar / Style Diagnostics
(F) HBJ Writer	IBM	Writing Organization / Word Processing / Style Diagnostics
(F) AI Typist	IBM	Word Processing / Real Time Spell Checking
(F) PC Paint	IBM	Drawing Program
(N) AutoCad	IBM	CAD/CAM Drawing/Drafting Program
(N) Sidekick	IBM	Destop Organizer

Adaptive Software

Funding/ Program Name	Computer	Description
(F) Prokey	IBM	Keyboard Alteration / Macro Writing
(F) Productivity Plus	IBM	Abbreviated Keyboard Input / Macro Writing
(F) Screen Talk	IBM	Screen Voice Output
(N) Words + Living	IBM	Alternate Keyboard Input / Voice Output
(F) Mouse Systems	IBM	Alternate (Mouse) Input
(F) Filtch	IBM	Keyboard Alteration

F = Obtained with Federal Grant funds
N = Obtained with University of Nebraska funds

E.C.D.S. HARDWARE VENDOR INVENTORY

Computers

Model	Vendor
Apple IIe	Apple Computer Corporation/Local Dealer
IBM PC	IBM Corporation/Local Dealer
IBM PC XT	IBM Corporation/Local Dealer
Words+ Living Center	Words+, Inc., Sunnyvale CA
NCR First Step	National Cash Resgister Corporation/ Local Dealer

Lap Top Computers

Model	Vendor
TRS 80 Model 100	Tandy/Radio Shack Corporation/Local Dealer
IBM PC Convertible	IBM Corporation/Local Dealer
Toshiba T1100Plus	Toshiba Corporation/Local Dealer

Printers

Model	Vendor
Panasonic KX-P1091	Panasonic Industrial Co., Secaucus, NJ/ Local Dealer
Apple Imagewriter	Apple Computer Corporation/Local Dealer
Epson LX-86, FX-85	Epson America, Inc. Torrance CA/Local Dealer
IBM Graphics Printer	IBM Corporation/Local Dealer
NCR First Step (NEC Spinwriter 3500R)	NCR Corporation, NEC Corporation/Local Dealer
IBM PC Convertible Printer	IBM Corporation/Local Dealer

Miscellaneous

Model	Vendor
Hayes Smartmodem 300	Hayes Microcomputer Products, INC., Norcross, GA/Local Dealer
Hayes Smartmodem 1200	Hayes Microcomputer Products, INC., Norcross, GA/Local Dealer
Amdek Monitor	AMDEC Corporation/Local Dealer
Gold Star Monitor	Gold Star Co., LTD./Local Dealer
Apple Disk Drives	Apple Computer Corporation/Local Dealer
Cannon 5 Star Typewriter	Canon U.S.A., INC./Local Dealer

Adaptive Equipment

Model	Vendor
VTEK Large Print Display Monitor	VTEK, Santa Monica, CA
VOTRAX Person Speech System Voice Synthesizer	Votrax, Inc., Troy, MI
DECTALK Voice Synthesizer	Digital Equipment Corporation
Omni-Reader Optical Character Reader	California Digital, Carson, CA
Mouse Systems Mouse Input Device	Mouse Systems Corporation, Santa Clara, CA/Local Dealer
Adaptive Firmware Card	Adaptive Peripherals, INC., Seattle WA.
Unicorn Board	Unicorn Engineering, Oakland, CA

E.C.D.S. SOFTWARE VENDOR INVENTORY

General Purpose Software

Program Name	Vendor
PFS Professional Write, Plan File	Software Publishing Corp., Mountain View, CA/ Local Dealer (All PFS Products)
PFS Graph	
PFS Report	
PFS First Choice	
Word Perfect	SSI Software, Orem, UT/Local Dealer
Magic Slate	Sunburst Communications, Inc., Pleasantville, NY/Local Dealer
Lotus Symphony	Lotus Development Corp., Cambridge, MA/Local Dealer
Apple Works	Apple Computer Corporation/Local Dealer
Sensible Speller	Sensible Software, Inc., Birmingham, MI/Local Dealer
Newsroom	Springboard Software, Inc., Minneapolis, MN/ Local Dealer
Crosstalk	Microstuf, Inc., Roswell, GA/Local Dealer
Remote Control	Kensington Microware, New York, NY/Local Dealer

Educational Software

Program Name	Vendor
Typing Tutor III	Kriya Systems, Inc., (Simon & Schuster, Inc.), New York, NY/Local Dealer
Knowledge Master	Academic Hallmarks, Durango, CO
Study Skills	C.C. Publications, Inc., Tigard, OR
Pro Sentence	Southwestern Publishing Co.
Pro Grammar	Southwestern Publishing Co.
EZ Pilot II	Hartley Courseware, Inc., Dimondale, MI
MPALS	IBM Personally Developed Software, Boca Raton, FL/Local Dealer

Special Purpose Software

Program Name	Vendor
Proteus	Research Design Asso., Inc., Stony Brook, NY
Rightwriter	Decisionware, Inc., Sarasota, FL/Local Dealer
HBJ Writer	Harcourt Brace Jovanovich, Publishers, San Diago, CA.
AI Typist	AIROS Corp., Lake Oswego, OR/Local Dealer
PC Paint	Mouse Systems Corporation, Santa Clara, CA/ Local Dealer
AutoCad	Autodesk, Corp., Sausalito, CA.

Adaptive Software

Program Name	Vendor
Prokey	RoseSoft, Seattle, WA/Local Dealer
Productivity +	Productivity Software International, New York, NY/Local Dealer
Screen Talk	Computer Aids Corporation, Ft. Wayne, IN
Words + Living Center	Words+, Inc., Sunnyvale CA.
Mouse Systems	Mouse Systems Corporation, Santa Clara, CA/ Local Dealer